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VIEWS, NEWS AND INTERVIEWS.

"I don't believe I was cut out for a household electrician," said Meekin, the lazy inventor, slowly putting one foot before the other as he entered the office of the ELECTRICAL REVIEW Tuesday afternoon of last week. "It was this way," he continued, in a raised tone, for he noticed that up to this time he had not attracted any attention. "We have a series of electric bells in our house and I told the goddess of my idolatry, when she returned from the usual Summer vacation with her aunt in the country (although all the neighbors supposed the family were at these ashore, staying at the Oriental), that she need not employ the usual expensive electrician to regulate the electric bells, but that if there was anything the matter I would fix it. Of course, the bells didn't ring and I started in to fix them. I got some new zincs and some sal-ammoniac and replenished the batteries, which were on the shelf just over my head. I got them all right for the test, when one of the batteries tipped over and the fluid emptied itself along my right trouser leg, destroying forever a $13 pair of trousers (I still have credit with the tailor, which accounts for the price of the trousers), and crushing the jar on the cellar floor. What I said needn't be recorded, but the bell-hanger of our neighborhood got a good job the next day, for which I am expected to pay $4.75. If this experience is worth anything to you or your readers you are welcome to it," and Meekin slowly revolved on his heel and ambled out.

Mr Samuel Insull, president of the Chicago Edison company, returned last week from Europe, where he had successfully placed $1,200,000 worth of five per cent 30-year bonds of his company. Mr. Insull stopped a day in New York, and most of his time was occupied in receiving congratulations of capitalists who appreciated the great work he had accomplished in placing these bonds in London at the present time. The bonds were sold at par.

Some New Crocker-Wheeler Electric Machines.

In the machine named as Fig. 2, as in the other Crocker-Wheeler machines, no expense has been spared to make it representative in its class. The frame is of best cast-iron with extension base and outboard bearing to relieve strain of belt.

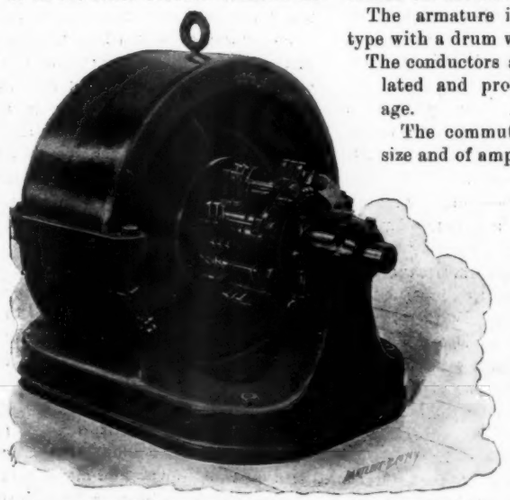


FIG. 1.—LOW-FREQUENCY ALTERNATING-CURRENT CROCKER-WHEELER DYNAMO.
Output, 1,000 Amperes, 60 volts.—For Calcium-Carbide Furnace.

The field pieces are of cast steel, of high permeability, and are cast into frame giving them a fixed position and positive support. They are then turned out accurately to gauge.

The armature is of the ironclad type with a drum winding.

The conductors are carefully insulated and protected from damage.

The commutator is of liberal size and of ample capacity.

The leads from conductors are let into slots in the commutator and held in position by two screws rigidly connected, which prevent any chance of an open circuit.

The bearings are of self-oiling type and fitted into pillow blocks.

The machine is symmetrical in appearance and excellent in operation. The outputs are as indicated on cut.

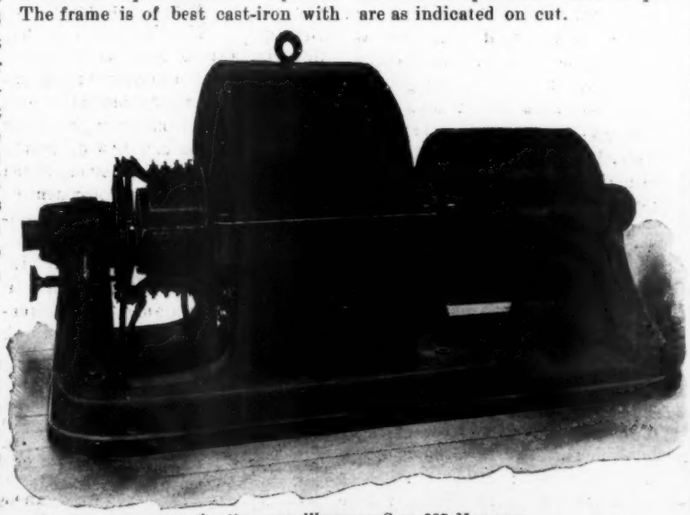


FIG. 2.—CROCKER-WHEELER SIZE 225 MACHINE.
Output at 115 or 230 volts: Motor, 225 H.-P. at 400 revolutions per minute. Dynamo, 200 K.-W. at 450 revolutions per minute. Output at 500 volts: Motor, 225 H.-P. at 450 revolutions per minute; Dynamo, 200 K.-W. at 500 revolutions per minute. Net weight, 15 tons.

Fig. 1 is identical in design with Fig. 2, but has no outboard bearing.

HOW EDISON SATISFIED THE CHIEF OPERATOR.

BY WALTER P. PHILLIPS.

It was nearly 25 years ago when I first met Edison. He came to Boston and was employed for a short time as an operator. He was regarded as a good-natured, but hair-brained chap, and my impression is that he was finally discharged from the service for inattention to business. He was fairly punctual at all times, excepting on pay days, when he would come straying in an hour late and blandly ask some of us to lend him half a dollar with which to get his supper. When reminded that he had received half a month's salary that day, he would smile, and, taking a brown-paper-covered parcel from under his arm, he would display a Ruhmkorff coil, an expensive set of helices, or something equally useless in the eyes of his comrades in the office; from which we were led to infer that the salary for the preceding half month had been exchanged for these apparently useless instruments. He spent a great deal of his time when on duty in making diagrams to show how wires could be operated in a multiplex way, and he held forth with undeniable eloquence on every conceivable subject excepting that relating to the prompt dispatch of such messages as the company then had on file for transmission. The office boys came and hung message after message on the little row of hooks in front of him, but Edison's interest in them generally carried him no further than up against the proposition that if by a system of rheostats, polarized magnets and batteries of different potentiality he could enable one wire to carry four sets of signals, two each in different ways, those troublesome messages, when intrusted to other hands than his, could be disposed of with increased rapidity. And so he used to sit and draw and dream, and let the business hang, until reminded by the chief operator that he must attend to his work. I did not even know his name at first, for some one had

referred to him as Victor Hugo when he made his appearance, and it was by that name that we generally spoke of him. Every device was employed to thwart his soarings after the infinite, and his divings for the unfathomable, as we regarded them, and to get an amount of work out of him that was equivalent to the sum paid per diem for his services, and among them was that of having him receive the press report from New York. He did not like this, the work continuing steadily from 6.30 P. M. until 2 A. M., and leaving him no time in which to pursue his studies. One night about 8 P. M. there came down an inquiry as to where the press report was, and, on going to the desk where Edison was at work, night manager Leighton was horrified to find that there was nothing ready to go upstairs, for the reason that Edison had copied between 1,500 and 2,000 words of stock and other market reports in a hand so small that he had only filled a third of a page. Leighton laughed in spite of himself, and saying: "Heavens, Tom; don't do that again!" hastened to cut the copy up into minute fragments and have it prepared in a more acceptable manner. While this was occurring, Edison went on receiving, and the frequent trips of the noisy dummy-box, which communicated with the press-rooms on the next floor, gave evidence that he was no longer gauging his handwriting with an ultimate view to putting the Lord's prayer on a three-cent piece. But all at once there was a great noise, and it was evident that Press Agent Wallace, a most profane man, was coming down the stairs, swearing and shouting as he came. Everybody grew excited except Edison, who was perhaps dreaming of the possibilities in some of the realms of electrical endeavor in which he has since won renown. But we did not have long to wait to know the cause of Wallace's visit. Kicking open the door, he appeared to us, but he was speechless. The last note of his voice and the last remnant of a vocabulary of blasphemy which was famous throughout the city was gone. Standing there with both hands full of small, white pages of paper, he could only beckon. Leighton approached him, and tenderly took the sheets of paper from him, to find that Edison had made the radical change from his first style of copy to simply putting one word on each sheet, directly in the center. He had furnished in this way several hundred pages in a very few minutes. He was relieved from duty on the press wire, and put on another circuit, while the much-tried Leighton devoted himself to bringing Wallace back to a normal condition, admitting of the use of his voice and the flow of his usual output of profanity.

The recent storm of wind and lightning was a very expensive one for the telephone and telegraph companies. In addition to blowing down poles and tangling wires and cables, several switchboards were burnt, generally through trolley wires being blown across the telephone wires. In one case, Greenpoint, L. I., the entire exchange was burned down, at a loss of about $4,000 to the New York & New Jersey Telephone Company.

TELEPHONE NEWS AND COMMENT.

The Central Union Telephone Company has purchased a $40,000 building in Indianapolis, and will use it exclusively for a new exchange and offices.

The American Electric Telephone Company, of Kokomo, Ind., is one of the "outside" telephone manufacturing companies that is evidently making a success. They are doing a large business in installing opposition exchanges.

The independent telephone company recently established at Youngstown, Ohio, announces that out-of-town extensions will be started next Spring; first to Hubbard and Sharon, then to Girard, Niles, Warren and Cleveland, and, finally, lines to New Castle and Pittsburgh will be constructed.

Has the Harrison Telephone Company, with its $40,000,000 capital (cut down from $80,000,000), retired from the field? Also, has anybody lately heard a squeak from the one-time awe-inspiring Standard Telephone Company? Perhaps these two undeveloped giants are only waiting for the Western Union-American Bell contract to terminate. Who can tell?

The Detroit Telephone Company, a new company, is pushing its conduit construction, and expects to have an exchange embracing over 2,000 telephones in the downtown district in operation by December 1, the schedule time for the opening. This company makes strong claims for its new non-infringing switchboard, capable of operating 5,000 subscribers.

The absorption of the Harrison Telephone Company by the Topeka, Kas., Bell company will result in a raise of toll rates. The rate for business houses will be raised from $24 to $36 per annum, and the rate for residences will probably be raised from $18 to $24, though that has not yet been fully determined. Manager Geo. Bayless says: "We are not going to hurry matters. It has been found that at $24 a year the telephone business is a losing game, and I am authorized to say that the rate for business houses will be raised to $36 after January 1. Nothing has yet been done about the rate for residences, but it is probable that it will be raised to $24, and the rates will then stand $24 and $36."

The Home Telephone Company, of Fort Wayne, Ind., an independent company, of which Mr. Geo. W. Beers is president, now has over 600 subscribers. The *Morning Journal*, of that city, says: "The toll lines of the Home Telephone Company have connection with 160 towns and cities in northwestern Ohio and northern Indiana and northeastern Indiana, reaching as far east and northeast as Lima and Toledo in the first named State, South Bend and Plymouth to the West, Huntington to the southwest, and Portland to the south in Indiana. This reaches the towns and cities in the business area contiguous to Fort Wayne and will be a vast convenience to local jobbing interests and to their customers without."

Mr. John M. Baker, general manager of the Iowa Telephone Company, states that the telephone interests of the State are to be put in the best possible condition. Already there are under consideration extensions of 400 miles. The greater part of this construction will be done in the eastern part of the State. The great bulk of the business of the State is done in the east of Des Moines and between Dubuque, Muscatine and Keokuk, and this territory will be highly developed in a telephone way when the company carries out the plans which it has in view. The building of the 400 miles of new line means an investment of about $80,000, so that it will be seen that the reorganization of the two companies into one is to be a great benefit to the patrons of the telephone in the State. The long-distance telephone lines are completed between Davenport and Chicago. They are not ready for use yet, as there are connections to be made at the local offices in the different cities, and there is a probability that it will be the middle of October before the line is ready for general use.

Marietta, Ohio, is very happy, the staid old town. A *Register* reporter talked to Wheeling, W. Va. Hear him: "The effect was simply astonishing. One can hardly believe the results of the long-distance telephone. Mr. Wolff's voice was as plain as if he had been standing by our side. Marietta is now in telephone connection with over 500 towns and cities in the United States, embracing New York, Boston, Baltimore, Washington, Philadelphia, Chicago, Milwaukee, Memphis, Louisville, Cincinnati and intermediate stations. Public telephone pay stations have been opened in Belmont, St. Mary's, Willow Island, Sistersville and New Martinsville. Our city need not hereafter suffer inconvenience and great amount of loss of time by traveling from one point to another. We can now go to the public telephone pay station, located in the telephone central office, in the Register block, and hold easy conversation with correspondents in almost any city in the East, West or South. We have no doubt but that our citizens will appreciate and freely patronize this long-felt want." We think the railroads would object.

Says the Boston *Herald*:

The 7th day of March, 1897, will mark the coming of age of the telephone, for it was on that day, in the Centennial year, that Professor Bell's wonderful invention was disclosed to the world by the issue of his fundamental patent. It was wonderful in many ways. The result achieved—the electrical transmission of articulate speech, with all its shades of tone and quality so accurately reproduced that the voice of a friend speaking at a great distance could easily be recognized—was a marvel that startled the world; but the astounding mathematical conception which lay behind it seemed to men of science almost like a revelation, while the extreme simplicity of the apparatus and its dual powers—for it could both speak and hear—astonished every one versed in mechanics. Sir William Thomson, now Lord Kelvin, put the thing in a nutshell when, upon his return to England in the Summer of 1876, he said, in his address to the British Association: "Who can but admire the hardihood of invention which devised such a very slight means to realize the mathematical conception that if electricity is to convey all the delicacies of quality which distinguish articulate speech, the strength of its current must vary continuously, and, as nearly as may be, in simple proportion to the velocity of a particle of air engaged in constituting the sound." And to sustain the statement that the discovery and invention came to men of science like a revelation, it may be added that on the evening of the day when the first crude apparatus was shown to him in operation, the same distinguished physicist said: "What yesterday I should have declared impossible, I have to-day seen realized."

Educational Curriculum in China.

They have no conception of learning as understood in the West—of Mathematics, chemistry, geology or kindred sciences, and of universal history, says John W. Foster in an article quoted in *Current Literature*. Indeed, they have a very imperfect knowledge of geography. Their curriculum of study embraces the Chinese classics and philosophy (a voluminous compilation, especially holding in eminence the teachings of Confucius), the theory of government and Chinese poetry and history. It is the standard fixed 2,000 years ago, and has undergone little change in the succeeding centuries.

One of our diplomatic representatives tells of a conversation had with one the most distinguished scholars and highest officers in the Empire, in which they canvassed their respective systems of education; and he reports that his Chinese friend had heard of Homer, Virgil or Shakespeare; knew something of Alexander having crossed the Indus, had a vague knowledge of Cæsar and Napoleon, but none whatever of Hannibal, Peter the Great, Wellington or other modern soldiers; and he was ignorant of astronomy, mathematics or the modern sciences. When the American Minister expressed surprise at these defects in Chinese education, the mandarin replied: "That is your civilization, and you learn it; we have ours, and we learn it."

Yet it must be conceded that Chinese scholars and officials are usually men of decided intellectual ability, and they can not be set down as uneducated because they have not followed the curriculum of study marked out by European civilization. It is a source of natural pride that they possess a literature and philosophy older than any similar learning of the West, and which even at this day are not obsolete, but exercise an elevating moral and intellectual influence on a vast multitude of the human family.

Submarine Telephone Work in New York Bay.

The recent connecting of Quarantine Islands (Swinburne and Hoffman), which are situated in the lower New York Bay, with the mainland, by submarine cables, for the purpose of direct telephone communication to, and, in fact, direct communication to all parts of the United States, is a telephonic and cable achievement of considerable importance.

Few citizens of the city of New York, in fact very few citizens of the State of New York, are familiar with the situation and purposes of these islands, which are occupied by the State Government for quarantine purposes. They are situated in the lower New York Bay, almost, one might say, in the Atlantic Ocean. These islands were, until quite recently, completely isolated from the world in general, no communication being had with the mainland, except by steam vessels under control of the State Commissioners of Quarantine.

After the experience of a few years ago with the importation of cholera, the Commissioners of Quarantine devoted themselves to the improvement of the islands and the service in general, and, finding great advantages would be had by being in a position to have instant communication with the various officers in charge of Hoffman Island, devoted to detention of and examination of the suspected cases arriving from foreign ports, and, with the Commissioners in charge of Swinburne Island, devoted to hospital service in the treatment of such cases as may have developed a contagious or infectious nature, decided upon installing a telephone system which would give direct connection with these islands.

The Commissioners submitted their requirements to Mr. W. R. Brixey, the manufacturer of Kerite cables, requesting that a plan be submitted whereby these islands might be connected one with the other, and with the mainland, by submarine cables sufficient to give them a service which would make instant communication possible between the islands and mainland, with the Health Physician's office, situated at Quarantine Station, Staten Island; with the Commissioner's office, situated in New York city, and with the State Government office at Albany, N. Y., together with such points as might be deemed necessary to reach by long-distance telephone.

The Kerite people submitted plans, which were accepted, and manufactured and successfully placed in position special submarine telephone cables between the islands and the mainland, the entire length of cable required being approximately three and one-half miles, constituting one of the longest, if not the longest, submarine telephone cable, considering capacity, which is now in service in the United States.

These cables having been successfully laid, were placed in connection with the service of the New York & New Jersey Telephone Company, giving private metallic circuit between Swinburne Island and Hoffman Island, Swinburne Island and Quarantine Station on Staten Island, and trunk line, Swinburne Island to central station of New York & New Jersey Telephone Company at Tompkinsville, Staten Island; also giving Hoffman Island private metallic circuit between Quarantine Station, Staten Island, and trunk-line service with central station New York & New Jersey Telephone Company at Tompkinsville, Staten Island.

This installation, with connections, having been tested, was found to be

VIEW IN LOWER NEW YORK BAY, SHOWING CABLES CONNECTING ISLANDS.

remarkably perfect, and reflects great credit upon the present Commissioners of Quarantine, upon the manufacturer of the Kerite submarine cables and upon the New York & New Jersey Telephone Company, whose officials took active interest in aiding to make the installation one of the most perfect in this section.

The situation of the islands, together with surrounding waters showing the route taken in laying of cables, will be observed in the accompanying cut.

A Good Wire Contract.

The Safety Insulated Wire and Cable Company, New York, Leonard F. Requa, general manager, has secured the contract for underground telegraph cables for the fire department of Cincinnati. It is understood that the wires in Cincinnati will all go underground, and this is the first order that has been placed and is one of considerable magnitude.

The reasons given for placing the contract with the Safety company were: First, for superior thickness of insulation; second, for superior insulation resistance and test requirements; third, for nearly nine years of experience in underground work of this kind, with universally successful results.

Drawbaugh Loses.

The Court of Appeals of the District of Columbia has decided that Daniel Drawbaugh never was the inventor of the telephone transmitter. This decision confirms the decree of the Commissioner of Patents and was handed down at Washington, September 29, and probably concludes Mr. Drawbaugh's efforts to secure recognition.

OUR CANADIAN LETTER.

GRANBY, QUE.—The installation of an electric light plant is being agitated.

SUSSEX, N. B.—The Sussex Water and Electric Light Company has been organized here.

BUCKINGHAM, QUE.—Ross Brothers will place an electric light plant in their new saw mill.

NIAGARA FALLS, ONT.—A Toronto syndicate propose purchasing the street railway charter here and will convert the road into an electric line.

GODERICH, ONT.—The town has awarded the Rogers Electrical Company, of London, the contract for the installation of 500 incandescent lamps.

ORILLIA, ONT.—G. E. Grant, Town Clerk, is receiving tenders for an electric fire-alarm system, consisting of seven alarm boxes and automatic striker.

WINDSOR, ONT.—Mr. George A. Goodman has secured the contract for the construction of the new street railway barns and power house on London street. The building is to be of brick, 165 by 65 feet.

OTTAWA, ONT.—Incorporation is asked for the Canadian Electric Light and Power Company, which propose to build an electric railway from Coburg via Port Hope, Toronto, Hamilton to Suspension Bridge, with branch lines.

TORONTO JUNCTION, ONT.—Joseph Barrett has made a proposition to take over the lighting plant and furnish lights to the town. In connection therewith, there is a project to erect a large factory at the corner of Keele and Vine streets.

REVELSTOKE, B. C.—The Revelstoke Waterworks, Light and Power Company will seek incorporation at the next session of the provincial legislature. Messrs. W. Cowan, J. Abrahamson, W. M. Brown and J. Downs being the promoters.

PETERBOROUGH, ONT.—Mr. J. M. Campbell, of Kingston, is preparing plans and specifications for the station and plant for the Auburn Light and Power Company. The council has under consideration the installation of a plant for electric street lighting.

HUNTSVILLE, ONT.—Tenders are being received by Wm. Rumsey, Village Clerk, for the construction of a system of waterworks and electric light as follows: Power station, pumping machinery, boilers, valves and hydrants, dynamo, engine, switchboard, wiring, etc. Plans and specifications can be seen at the court house.

QUEBEC, QUE. — The adjourned meeting of the Quebec Street Railway Construction Company will be held on Thursday, when the provisional directors will be elected. It has been decided to close the subscription books. The main line from Lower Town to St. Roch's will be started immediately, and it is expected that this part of the line will be completed this Autumn.

MONTREAL, QUE.—The town of Maisonneupe in October, 1891, contracted with the Royal Electric Light Company to furnish all the plant and appliances necessary for an electric light service for the municipality for the sum of $9,300. The company were stopped, first, by an injunction after beginning the work, and when the injunction had been quashed by the courts, force was used to stop the employés of the company from working. The main contention was that the contract which had been given was not within the charter powers of the town to grant. Judge Pagnuelo on Saturday held the contrary view and found for the company, giving them judgment for $4,861, with interest and costs, against the town.

MONTREAL, QUE. — According to the promise of the managing director of the Montreal Street Railway Company, that work would be commenced on the Centre street and Cote des Neiges road route after the close of the exhibition, a start was made. A gang of about 20 men were set to work on Guy street, starting from St. James. If the line is to be completed before the first of December the company will require to increase their force of laborers considerably, as the council does not appear to stand any more dilly-dallying in the matter.

The Park & Island Railway Company is making rapid progress in the construction of the extension to Lachine, and it is expected to have the line through before the snow flies. The track between the city limits and Rockfield is about laid and the grading is completed as far as the Dominion Bridge Works. The line to St. Laurent is now open and running. The work on the new power houses, located at Lachine and St. Laurent, is progressing, and it is expected that both will be ready to turn the power on this Autumn.

J. A. C.

Montreal, September 25.

PERSONAL.

The many friends of Mr. George Stanmore, manager of the A. K. Warren & Company, of New York, will be glad to know that he has reached the point of convalescence after his serious illness.

Mr. Paul Minnis, former general manager of the Home Telephone Company, of Mobile, has accepted the position of electrical engineer with the Best Telephone Manufacturing Company, of Baltimore, which company has purchased the switchboard and telephone patents of Mr. Minnis. For the present Mr. Minnis will make his headquarters in New York city, in charge of the company's interest here.

"Roentgen" Rays in 1847.

A *Scientific American* correspondent points out, under the heading, "Nothing New Under the Sun," that in the June 5, 1847, issue of that journal appeared an announcement to the effect that a Belgian savant had "just discovered that electric light directed on the human body makes it so diaphanous as to enable the arteries, veins, and nerves to be seen at work, and their action to be studied." Although, adds the correspondent, Crookes tubes were not mentioned, it is possible that some similar device was used, in the then undeveloped state of electrical science. It would be interesting to know who the Belgian savant was.—*London Electrical Review.*

GAS VERSUS ELECTRICITY DIRECT FROM COAL.

BY D. M. DUNNING IN THE "ENGINEERING MAGAZINE."

(*Concluded from page 163.*)

Not until a recent period did gas companies—in this country, at least—make much of an effort to save their third important by-product, ammonia; and it is an interesting feature of this saving that the necessary treatment of the gas in process of manufacture, in connection with such saving, has been so material an improvement over the old treatment as to more than compensate for any added expense caused thereby, leaving the ammonia saved out of the question. Formerly, the gas was often washed in a shower bath of cold water, and many of its illuminants were washed away with the ammonia into the sewer. Now, only an exceedingly small quantity of water (which has great affinity for ammonia) is allowed to come in contact with the gas, and this contact, by ingenious mechanical contrivances, is continued over a long and sinuous course, entirely removing the ammonia without disturbing the illuminants and producing a valuable article of commerce. The storage and concentration of ammoniacal liquor requires careful and skillful handling, as it is an extremely fugitive substance, always anxious to escape to the clouds, and return thence to the farmer in his fields. Five to seven pounds per ton of coal is a fair production of this by-product, and between 30 and 50 cents per ton of coal the average revenue.

This summary of the state of the gas industry at the present time, in respect to the saving of residuals, brief as it is, warrants the statement that the dividends of to-day are declared from the wastes of yesterday; and the knowledge of it seems to touch, in the mind of the gas engineer, whenever by chance he happens to gaze at the chimney of an electric lighting company, a sort of sympathetic chord in harmony with the feelings of the stockholders thereof, in the shape of a vision of dividends vanishing in smoke, worse than wasted, because an intolerable nuisance.

Important as the mechanical evolution of the industry has been, it fairly sinks into insignificance in comparison with what has been accomplished and with the possibilities in view, in the evolution of the business end of the industry, following the line of enlarged output at lower prices. And, in mentioning lower prices, it is well to suggest how very much depends on a proper representation of the industry to the people, as it is not so much what the people pay as what they think they pay that counts, and "what they think they pay" depends almost entirely on their feeling that they are getting the worth of their money. In the development of the business end of the industry we have a field of almost limitless extent, and to properly go over it would require a paper by itself. Such a paper would consider the policy of offering to the customers of the company small cooking and heating utensils on condition that the connections and fittings therefor be purchased at a nominal price, and of following soon with a second offer to exchange these utensils for larger ones, which would generally result in the retention of both by the customer. Then comes the well stocked store of gas appliances, centrally and conveniently located, and the exhibitions given therein, including cooking by experienced cooks furnished by the company and using the modern gas range; such exhibitions to be in charge of the lady managers of the various charitable institutions of the city with the privilege to them of disposing of the food products for the benefit of their various charities; all this to be followed by a vigorous effort to supply all classes of customers with cooking and heating appliances of all kinds and sizes. And then follows the canvassing for customers, for which a commission is paid, together with the piping of houses and the sale of fixtures, thereby enabling the poor man to become a customer at an outlay of from $5 to $10, and giving him, with the Welsbach lamp, a better, more economical and more satisfactory light in every way than he had with oil.* And this only opens the door for an almost unlimited number of other developments, the introduction of gas engines being a very important one. For lack of space we must dispose of this portion of our subject with the remark that the valuable management for the gas works of the future will be the management that understands how to extend the business and has the ability to do it, and it will be a mission requiring lots of energy, patience and hard work, but fully as beneficial to mankind as any in the land.

Progress seems to be the watchword in all lines of industry in the present age, and our electrical friends just at present are unusually active. Among the many startling announcements of recent date in reference to progress in electric lighting, probably none seems so tangible and has attracted so widespread attention in the scientific press as the discovery of Dr. W. W. Jacques, of Newton, Mass., of a chemical process by which electricity can be generated direct from coal.

A fair representation of these articles comes to us through the July number of *The Engineering Magazine*, and the first thought of the practical man is as to how it will affect existing interests and investments. When such high authorities as Professor Cross, of the Massachusetts Institute of Technology, and Professor Rowland, of Johns Hopkins, declare it to be one of the great inventions of the nineteenth century, it certainly behooves one to give it a careful investigation.

So radical are the changes in the production of electricity by this method, that one writer, on page 657 in this July number, is sanguine enough to proclaim that "dynamos will be sent to the attics, and it will be cheaper to heat and work by electricity than by fires." And similarly we find in other magazines, page after page of interesting scientific enthusiasm pertaining to this particular invention, until we are constrained to give it a careful and impartial examination. The process may be briefly described as follows:

Iron retorts are set up on end in a furnace. The retorts are partially filled with caustic soda. They also contain a piece of carbon suspended from the top, and are provided with an air supply at the bottom. The furnace and contents are to be brought up to a temperature of 400 or 500 degrees centigrade, and a supply of air forced up through the fused mass of soda, the oxygen from which attacks the carbon and forms electrical energy, with which arc and incandescent lights can be immediately maintained. The efficiency is said to be such that thirty 16-candle incandescent lights were maintained for nearly 19 hours with a consumption of only eight pounds of carbon in the retort; and this is pronounced an efficiency of about 90 per cent for the eight pounds of carbon consumed in the retort. But what about the, perhaps, 80 pounds of carbon consumed outside of the retort to maintain this temperature of 800 to 900 degrees Fahrenheit and the air blast for the 19 hours? So disposed are enthusiasts in science to exalt any new thing that this, probably the real source of the energy, is passed over in comparative silence. If we call an enthusiast's attention to this, we are told that they are on the track, and the next step will be to accomplish all of this without the aid of outside heat, which brings up the suggestion: Suppose you could do this without the aid of outside heat, or, what is more probable, suppose a small portion of the energy generated—say not to exceed 10 per cent of it—could be diverted to maintain this heat and pump the air. "Then," the enthusiast exclaims, "we would move the earth; we would certainly revolutionize all existing things." "But what about the carbon consumed in the retort?" suggests the practical man. Could you not manage in some way to furnish this, or a large portion of it, without cost? And, if you could, suppose we compare the efficiency which you would then attain with the efficiency of the modern gas-works. They have the retorts set in the furnace. They are charged with carbon in the form of coal. According to scientific authorities, something more than 20 per cent of the energy is driven off in the form of carbureted hydrogen, called gas, which can be safely and easily stored without loss or deterioration for any length of time; and the practical man claims that the other 80 per cent is retained as follows: Forty per cent in the form of coke, 25 per cent in the form of tar and 15 per cent in the form of ammonia.

One-fourth of the coke, or 10 per cent of the entire amount of energy, suffices to do all the work of heating the furnaces, and the balance of these residuals, in many cases, sells for enough to pay for all the coal, and, on an average, should pay for about 80 per cent of it.* But the scientist comes forward with an array of heat units and standard candles to prove that 80 per cent of the energy does not remain in form of the above-named residuals, and the practical man waives him aside with the exclamation that they pay 80 per cent of the coal bill, and that the energy which pays the bills is the right kind of energy for him; and he claims that, if he can eliminate 80 per cent of the raw material by the sale of residuals, then he has a right to consider the entire production of the original article sought as the production of the remaining 20 per cent of the raw material, which would show an efficiency of the full 100 per cent of energy. And then he calls attention to the wonderfully efficient character of this energy when utilized with the oxygen of the atmosphere through Bunsen burners, incandescent lamps and gas engines for heating, illuminating and power purposes.

The gas engineer calls on nature twice during the carbonizing of his coal for assistance from the oxygen of the atmosphere, as has been shown under the description of the regenerative furnace; he calls again for assistance in the distribution of his product under the weight of the atmosphere, which does it quietly and effectively, unseen and unknown to most of us; and he calls again at the utilization of the product for a supply of oxygen to support its combustion, for all its various purposes of light, heat and power, calling twice in the use of the Welsbach lamp, or for a double service, and producing at once the most economical and efficient artificial illumination yet known to man, and which may well be called "one of the great inventions of the nineteenth century." And thus he goes hand in hand with nature in all the ways of his profession, so differently from his friend, the electrical engineer, who seems at all points to be endeavoring to thwart her, and, with his lamp, depends for his success upon his ability to oppose her. For nature abhors a vacuum.

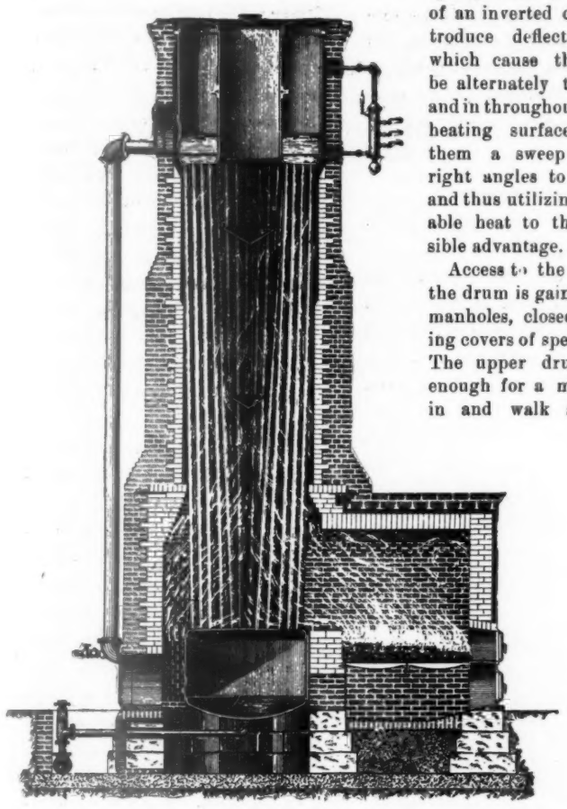
And now comes the philanthropist, and desires to know why, under all of these advantages, the price of the product does not fall. Why are not companies formed to give it away, so that people may rise up and call them blessed? The reply might be made that, in common with other corporations that deal with the public, they are always sure of the blessing. Perhaps a better reply would be that water is free—free as the air—and stored in inexhaustible quantities at the very doors of many of our cities; and yet it costs the people of most cities more than gas. Suppose it were possible to store daylight and distribute it by night through "vacuum tubes;" does any one imagine that it could be done for nothing? It is not the first cost of the raw material that counts in a service of this nature. It is the long train of contingent expenses that rises up to swamp the enthusiast when he attempts to move the world too rapidly. But the world is bound to move, and we are glad of it, and we hope to see the Jacques furnace improved so that it will become self-sustaining—perhaps float off into perpetual motion. And, when this is accomplished, then we think that, in point of efficiency, it will just about begin to get into comfortable competition with the modern gas-works.

* At Auburn, N. Y. (population, 30,000), over 300 customers have been secured in this way during the past two years. Many of these had their houses already piped, but nearly 100 houses have been piped by the company, which has received during that time: For the piping of houses, $1,986.52; for ordinary gas fixtures, $2,023.80; for Welsbach fixtures, $3,230; for stoves, ranges and other cooking and heating appliances, $2,023.80. Stoves, ranges, etc., had been largely supplied previous to this time. About 30,000 feet of wrought-iron pipe of various sizes have been used during the past two years, about one-third of which was for services.

* At the gas-works in charge of the writer, 400 miles from the coal mines, the residuals sold pay more than 80 per cent of the coal bill.

The New Cahill Boiler Described.

The Cahill boiler, one of the straight-tube variety, brought out only a few years ago, consists, essentially, of two drums, arranged one above the other and connected by four-inch tubes. The upper, or steam drum, has an opening through its center for exit of the hot gases. These, although reduced to a very low temperature in passing through the closely grouped tubes of the boiler, will impart most of their retained surplus heat to the metal sides of the passage through this upper drum, thereby tending to slightly superheat the steam in the chamber above. The water line in the upper drum is about a foot above the bottom of the drum, the latter itself being about six feet high in the clear inside, leaving a space of five feet between the surface of the water and the point at which the steam is drawn off from the boilers, thus tending to prevent the carrying over of water in the steam.



THE CAHILL BOILER, SHOWING CIRCULATION PIPES.

An external circulating pipe comes out from the upper drum, just below the water level, and is carried downward, outside the brickwork, to a point just below the tube sheet of the lower drum, where it enters that drum. The boiler rests upon four iron brackets, riveted to the lower, or mud drum, supported upon four piers of the foundation, the entire structure standing without contact with the brickwork, thus allowing the boiler every freedom for expansion, without in any way straining the brick setting. In all places where pipe connections are made to the boilers through the walls, they are incased in expansion boxes.

Owing to the fact that the hot gases escape through the central opening in the upper drum, the upper tube sheet has a circular opening in its center, leaving a central open space between the tubes, which gradually narrows to the bottom tube sheet. Advantage is taken of this space, which is in the form of an inverted cone, to introduce deflecting plates, which cause the gases to be alternately thrown out and in throughout the whole heating surface, giving them a sweep at nearly right angles to the tubes, and thus utilizing the available heat to the best possible advantage.

Access to the interior of the drum is gained through manholes, closed by swinging covers of special design. The upper drum is large enough for a man to get in and walk around, so that the tubes may be easily examined and scale removed if necessary. The scraper used for cleaning the tubes is made in sections a trifle less than six feet long. Four of these sections are used, and the man who is cleaning the boiler takes them into the upper drum and pushes the first section down as far as it will go, then simply hooks the section to that, and continues doing this until the scraper has gone entirely through the tube, forcing any scale that may have been deposited on the sides of the tube straight through to the bottom drum.

Ample provision also is made for removing defective tubes from the boiler. To this end the top part of the upper drum has six hand-holes, besides two others for steam pipe and pop valve connections. By means of these eight openings, any of the tubes needing removal, after having been cut loose from the tube sheets, can be pushed up through the tube-hole from which it has just been cut, and through the most convenient of these openings in the top head. The new tube, to replace the defective one, is just as readily passed into the boiler through the same openings.

The patent manhead used on these boilers, while a very simple device, yet is something of great importance. Engineers who for years have been annoyed with the laborious and tedious practice of taking manheads out of boilers and lifting their heavy weight to a place of safety, and then going through the great annoyance of putting them back into their places again after the work in the boiler is finished, will appreciate fully the device. By simply loosening the nuts on the manhead, a slight push swings the head in as though it were a door, and it fits back in place against the drum without occupying any appreciable amount of room, and when the time arrives to again close it, it is pulled back to its place. Being hinged as it is, the seats come together in exactly the same place every time, and the joint being made tight once is tight for all time; less than one minute being required to open the manhead and close it again perfectly tight.

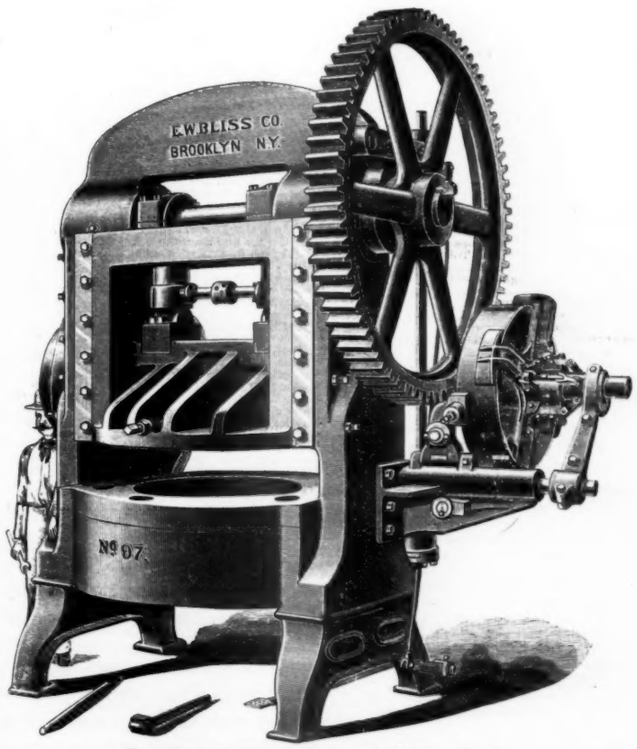
Mr. Max Osterberg, E. E., M. A., consulting engineer and graduate of Columbia College, has become associated with the Correspondence School of Technology, Cleveland, Ohio, in the capacity of instructor and representative for Greater New York. Mr. Osterberg is well known as a lecturer, and to the readers of the electrical press as a writer of established reputation, and as an investigator of Roentgen-ray phenomena. The school has recently been developing both elementary and advanced courses, and the addition of Mr. Osterberg to its already strong teaching force will be of value to all three of the electrical courses, as well as to the work in physics and advanced mathematics.

In Macon, Ga., the telephone company is putting its wires in conduits. This improvement will probably cost $100,000.

Bliss Press for Large Armature Disks.

The E. W. Bliss Company, of Brooklyn, N. Y., have designed for electrical manufacturers a machine which is especially adapted for operating large and accurate-cutting and perforating dies, such as are extensively used in the manufacture of armature disks and sections for electric motors and dynamos. This press, illustrated in this issue, embodies a number of special features, which have not heretofore been used in connection with presses of this class.

A feature is the application to this press of a new automatic friction clutch. The pressure of the foot treadle shown releases a weight which actuates the powerful friction clutch on the back shaft, thus starting the press almost instantaneously and obviating entirely the severe shock which in the positive clutches tends to destroy the parts and frequently causes expensive delays and repairs. After the shaft has made one complete revolution, the cam releases the friction clutch, throwing into action at the same time a brake, and thus stopping the slide at the highest point of the stroke. The large gear wheel, instead of revolving continually, is, with these new clutches, keyed to the shafts and is at a standstill until the clutch is thrown into action. This constitutes an additional advantage in the saving of considerable wear on the shaft and wheel hub. There is nothing about these clutches which is liable to get out of order, and for whatever wear, which may be occasioned by continuous use, easy means of compensation are provided. The press described is for the very largest sizes of armature blanks and, as shown, weighs 25,000 pounds.



NEW BLISS PRESS FOR MAKING ARMATURE DISKS.

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Special Notice to Advertisers.

CHANGES for advertisements must be in this office by Friday noon for the following week's issue.

NEW ADVERTISEMENTS should be in the office not later than Saturday noon to insure publication the following week.

NEW YORK, OCT. 7, 1896.

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These are better times. And the improvement continues, and every one who votes for the sound-money ticket, November 3, will advance the cause of prosperity.

Better times have arrived. In one day last week we got a new subscriber from India, a new advertiser from Philadelphia, and a man sent us a new five dollar bill for a book. Yes, times are getting better.

There have been many good stories told about Edison, but we think one of the best is the incident so interestingly described by Mr. Walter P. Phillips, general manager of the United Associated Presses, published on another page in this issue.

Were all of our esteemed contemporaries asleep last week? The Tesla patents were issued the week before, and yet they didn't discover them. By dilligently perusing the columns of this journal they will be able to keep informed (as do some 50,000 other readers) on what is going on of importance in the electrical field.

At last our progressive citizen, Mr. Russell Sage, concludes that it is possible for electricity to replace steam on the elevated roads of New York, and announces a probable trial and inspection by himself and Mr. Geo. Gould, of the Westinghouse system, at Pittsburgh. Electricity could have been the motive power on these roads years ago, at a great saving to the stockholders and an immense increase of comfort to patrons.

TELEPHONING ACROSS THE OCEAN.

Of the many daily papers that come to this office, we find the New York *Tribune* one of the most ably conducted. Its utterances of an electrical and scientific nature are accurately and intelligently worded. In a recent issue, speaking of the new Russian telephone for long-distance work, it makes the following comment, and we heartily agree with it that, if this telephone is successful in sending messages across the ocean, from continent to continent, it will be, indeed, a "tremendous event:"

A Moscow electrician, M. Kildischewski, thinks he has discovered a process by means of which telephonic messages may be sent over any wires to any distances with no diminution of their audibility. His home experiments have been extremely successful, and he has talked across the ordinary wires from Moscow to Rostoff, on the Don, a distance of nearly a thousand miles, the message and response being as clearly heard as if they were uttered across a table. M. Kildischewski has gone to London to try to communicate with New York across the cable, and if he succeeds it will place his name in the front rank of electricians, beside those of Edison and Tesla. We are likely to talk direct with London, Paris, St. Petersburg, and even Peking, some day, and it may be that that wonderful consummation is not long to be delayed. M. Kildischewski's experiments will be awaited here and everywhere with the utmost interest. We can at present talk 1,000 miles and more over the wire without the least difficulty, and it does not appear that he has so far much exceeded this achievement. But if he gets an audible message through the cable it will be a tremendous event.

FIFTIETH ANNIVERSARY OF THE TELEGRAPH IN BELGIUM.

In order to appropriately celebrate this great event, the Belgium administration has opened a fine exhibition in one of the large halls of the Central Post and Telegraph office in Brussels. The government has attempted to bring together every form of telegraph instrument that has been practically used in the Belgium service, and in order to give the laymen a better knowledge of the advance that has been made in such apparatus, each instrument is being operated. Each visitor is at liberty to deposit a message at one side of the hall, which is immediately delivered to him at the opposite, and as the exhibition is free and excites universal interest, it is needless to say that the hall is crowded from morning to night.

The real celebration took place on September 22 in one of the magnificently decorated halls of the Academy. The programme consisted of a discourse on the early time of the telegraph, by the present chief, Mr. J. Banneux, who is well known as one of the most efficient telegraph engineers of Europe. Next followed a cantata, sung by 290 men chosen from the *personnel* of the telegraph service. Then came the distribution, by the Minister of Posts and Telegraphs, M. Vandenpeereboom, of the decorations granted to employés who have been in the service for 25 years. In the evening a banquet, presided over by the Minister and enjoyed by 500 participants, concluded the festivities.

Interesting to Americans was a large painting by E. M. Vanden Bussche, exhibited in the hall of the Central Post and Telegraph, which represented Samuel F. B. Morse holding a paper tape in his hand, containing the famous words, "What hath God wrought," and resting the other hand upon a terrestrial globe surrounded by telegraph wires. On another page is published the history of the telegraph in Belgium.

The electrical engineers for the Japanese Government, Seiryo Mine, Ruiji Nakayama and Yotaro Yadachi, who have been spending some months studying electrical systems in this country, recently spent several days with Mr. I. H. Farnham, electrician of the New England Telephone Company, Boston, with particular reference to studying questions of dangers to underground pipes, and other metal structures, due to electrolysis from railway currents. Mr. Farnham has a large amount of data in his files, as well as large practical experience in locating and minimizing this danger.

THE FINANCIAL SIDE.

The improvement in stocks noted in my last report continued throughout the week, closing the market higher. There was a decided broadening of interest that lifted transactions above the professional level. This was expressed in an outside demand for the better class of stocks and the steady absorption of bonds. The continued advance in wheat, which up to date amounts to some 13 cents per bushel, is one of the strongest bull factors in the situation. All evidence that has been brought to bear upon the movement points to the fact that it is due to the laws of supply and demand and not to manipulation. If this be the case, it will make votes for McKinley at the rate of thousands per day. The money market has behaved very naturally and favorably to business interests. Gold continues to arrive, and all business interests who wish such accommodations are receiving it from the hands of bankers. With the exception of iron and steel, most staples show a hardening in values. The outlook is brighter.

There was very little of special interest in electrical securities in the week. The more active advanced slightly in sympathy with the general market movement, reacting towards the opening market figures. The last quotation on General Electric was 28¼, and Western Union, 83½. American Telegraph and Cable was 90 bid and 91 asked. Commercial Cable was 145 bid, as against 125 bid a month ago. The New York & New Jersey Telephone Company has declared a regular quarterly dividend of 1½ per cent, payable October 15.

Following we append the regular monthly comparison of bid and asked quotations of leading active electrical stocks. All the changes noted have been for the better, and in some stocks there has been very decided improvement. This is notably the case with Bell Telephone, which advanced 10, New York & New Jersey, 11; Central & South American Telegraph, 13; Commercial Cable, 20; Mexican Telegraph, 5; Postal Telegraph, 4; Western Union, 4, and General Electric preferred, 10. Illuminating stocks, as a rule, were remarkably stable. The quotations follow:

	Oct. 3.		Sept. 5.	
TELEPHONE:	Bid.	Asked.	Bid.	Asked.
American Bell.....	207	207½	197	199
Bell Telep., of Mo.....	183	205	185	205
Erie Teleg. & Telep ...	57	...	56	57
Hudson River Telep...	45	53	45	53
Mexican Telep.....	65c.	....	65c.	70c.
New England Telep...	90	93	91	92
N.Y. & N. Jersey Telep.	121	123½	110	115
" " Penna.	78	83	78	83
Pennsylvania " "	36	...	....	....
Providence " "	79½	81	....	81
Troy Telep. & Teleg...	90	100	90	100
TELEGRAPH:				
American Dist.....	22	27	22	27
Am. Teleg. & Cable....	89	92	....	....
Cent. & S. Amer. Cable.	113	117	100	110
Commercial Cable....	145	....	125	....
Gold & Stock.....	100	105	100	105
Mexican Teleg.....	185	195	180	190
Pacific " & Telep.	70	....	70	80
Postal Teleg. & Cable.	78	81	74	77
Western Union.....	80⅝	83¾	76¾	77⅛
ELECTRIC:				
Boston Elec. Light ..	100	101	103½	104½
Detroit Elec. Works...	....	.05	....	.05
Edison Ill., Boston...	....	137	....	135
" " Brooklyn..	94	96	91	93½
" " New York..	92	95	....	....
" " Co. St. Louis	10	17½	10	17½
" Light & Power Co., San Francisco.	117¾	118¾	108½	109¼
General Electric.....	28⅝	28⅞	23⅝	24⅛
" " Pfd...	65	70	55	60
Penn. Ht., Lt. & Pwr....	....	13¾	9¾	10
" " Pfd.) $20 paid in.)	....	20¼	12	....
Southern Elec. Lt. & Pow.	9	13	10	11
Westinghouse Com....	22	....	....	24
" Pfd....	49½	....	47½	49

BAIN.

New York, October 3.

ELECTRICITY ON THE ELEVATED.

A SUCCESSFUL START MADE ON MONDAY IN THE PRESENCE OF RUSSELL SAGE AND OTHERS.

The first trip of a new electric motor, equipped with 250 cells of storage battery, using the third rail connection, was made Monday morning, at nine o'clock, on the Thirty-fourth street branch of the Third Avenue "L" system, New York. The trip was made in the presence of Russell Sage and a party of railroad men and a number of newspaper representatives.

The motor car is about 20 feet in length and in the center rises the operating compartment, on either side of which the battery of cells is placed. The test was looked upon by the officials present as very satisfactory and the motor will be in continuous use on this branch for a time to demonstrate the practicability of the system with a view to its further introduction. The batteries in use are the most improved form made by the Electric Storage Battery Company, of Philadelphia. Mr. J. B. Entz has had charge of the construction of this first locomotive and was well pleased with the result of the first trial.

The Presidency of the Metropolitan Railroad Company, of Washington.

TO THE EDITOR OF ELECTRICAL REVIEW:

In your issue of September 30, 1896, there appears an article under the heading "Presidency of a Washington Street Railway," that does a great injustice to a gentleman who has the implicit confidence of his board of directors, and, I believe, of every stockholder of the company.

It was well understood by the directors when Mr. Phillips first assumed control of the affairs of this company, that, as soon as he had completed the construction of the road and had put it on a sound financial basis, he would retire.

This he has done, having built and equipped the finest electrical (underground) road in the world, paid a dividend at the rate of 10 per cent, this, too, when but one line (and that the shortest) had been in operation a year, the other line having just begun operations the first of August.

As to Mr. Phillips not having the approval of his official actions of the entire board of directors, I will state: Nothing that he has done but what has met the unqualified approval of them all, and to-day, if he could be prevailed upon to reconsider his resignation, one and all of them would be delighted.

Having accomplished his purpose in coming to the road, and being a man of large means, there was no inducement for him to continue with it longer. Had he desired to do so, I am sure he would have considered the proposition made him by one of the directors when he said, "Mr. Phillips, is it salary you want? If so, name it yourself." When he leaves he will retire to his country home, there to enjoy the peace and rest he has so richly earned.

Very respectfully,
G. B. COLEMAN,
Secretary.

Washington, D. C., October 2.

History of the Telegraph in Belgium.

When in 1849 the telegraph lines of Prussia and France had spread to the frontiers of Belgium, the government, by order of Minister M. Rolin, dated December 1, 1849, instituted a committee of three men to study the telegraph question, especially with the view of applying it to the management of railroads.

The committee reported March 24, 1850, and on the 22d the Minister signed a draft of law which authorized the government to establish telegraphs along all State railroads (609 kilometres), and asking for the building of such lines an appropriation of 250,000 francs. The draft became a law, and was promulgated June 4, 1850.

By an appropriation of 60,000 francs the State was enabled to finish a telegraph line between Bruxelles and Anvers, September 1, 1850, and to use on said line Cook & Wheatone apparatus. So much energy was shown by the government that at the end of the same year a telegraph loop connected Ostend and Verviers via Gant, Termonde, Malines and Louvain, a total of 241 kilometres.

According to the report of the commission, it was decided to use galvanized iron wire of four millimetres diameter, while double needle English telegraph apparatus should be used for domestic service. In the international service any apparatus was employed which was satisfactory to the foreign governments. The first international relations of Belgium were with the Austro-German Telegraph Union, May 16, 1850.

On April 20, 1851, international telegraph service opened between Bruxelles and Paris. On this line a Foy-Breguet apparatus was employed. On January 1, 1861, the Belgium State telegraph offices used 91 Morse apparatus, 130 Libens, 10 Breguet and three Siemens.

January 1, 1870, we find 623 Morse, 29 Libens and 11 Breguet apparatus. At the same time Belgium had 305 telegraph offices open to the public, and 128 railroad stations that could be utilized for private telegraphic correspondence, and a total kilometre of wire employed in the service amounting to 15,000. During the year 1869, the number of private telegrams amounted to 1,722,586, service telegrams to 315,722, and receipts to 1,323,000 francs.

During that year the service was more or less revolutionized by the introduction of the Hughes printing telegraph apparatus, which since then has become the universal international telegraph instrument. During the decade 1870-1880 the Belgian administration has very successfully adopted on its lines multiple telegraphy; in fact there is scarcely a European administration that utilizes so thoroughly and so efficiently every telegraph wire, and this is due largely to the untiring efforts of Van Rysselberghe, one of the most gifted Belgian electricians, whose untimely decease can not be too deeply mourned.

The condition of the telegraph service December 31, 1894, was as follows: Total kilometre line, 6,326; total kilometre wire, 54,740, which includes 23,236 kilometres telephone wire. Adding thereto private wires the total kilometre of telegraph wire, January 1, 1895, amounted to 58,078, requiring 1,806 telegraph apparatus, occupying 4,972 State railroads, and employing altogether 8,739 people. V. B.

Electric Plant for the City of Mexico.

United States Consul Germain writes to our government from Zurich, July 16, 1896:

In the official commercial organ of Switzerland, I notice that the consul of Mexico stationed in this city sent a communication to the editor of the paper, wherein he states that the authorities of the City of Mexico are about to introduce electric lighting, and invites bids from Swiss firms engaged in the manufacture of electric appliances and willing to enter into a contract to put in the plant. He states that upon application to him, either by correspondence or by a call at his office, he will submit plans and specifications, also furnish detailed information as to just what is required. This reminds me that on my last east-bound trip, while crossing the ocean to return to my post, I met a Haytian from Port-au-Prince, who stated he had a concession from the authorities of his native city to supply it with electric light. He was on his way to Europe to see where he could buy the best plant and appurtenances for the least money. A prominent Frenchman engaged in the coffee business near Port-au-Prince confirmed what the concessionaire told me.

It strikes me that our neighbors are going out of their way to secure in Europe what they could find as good, if not better, and at as low a figure, nearer home.

I have had an idea that we can beat the world on electric machinery and appliances, and I dislike to see business slipping away from us right by our doors. It seems to me the attention of American firms engaged in that line of trade should be called to the above information.

KIND WORDS.

HE RETURNS TO AN OLD FRIEND.

TO THE EDITOR OF ELECTRICAL REVIEW:

I have accepted a position with the telephone company as manager, and now desire to have my old friend, the ELECTRICAL REVIEW, visit me again each week. I will do what I can to secure you new subscribers.

W. S. RUSH.

September 14, 1896.

WELL RECOMMENDED.

TO THE EDITOR OF ELECTRICAL REVIEW:

Please send me a copy of your paper, as it is recommended by the official journal of the Amalgamated Association of Street Car Employés of America.

Very respectfully yours,
HENRY E. DAGLEY.

September 29, 1896.

New X-Ray Plates.

After a long series of experiments, the Keystone Dry Plate and Film Works, Wayne Junction, Philadelphia, have perfected a series of X-ray plates known as the "Carbutt," which may be used under X rays without further preparation. The principle of construction claimed for these plates is that the composition of the emulsion is such that the rays are largely absorbed, producing under short exposure more detail in the radiograph negative than can be obtained on ordinary dry plates.

ELECTRIC MINING MACHINERY.

BY IRVING HALE, DENVER.

As will be seen from an examination of the appended list of plants, electricity is being applied to the operation of every kind of machinery used in mines.

Hoists—The first application of electric power, and one of the simplest, was to hoisting; the rotary motion of the electric motor being easily adapted to this work.

Most of the earlier machines consisted of street-car motors geared to flat-friction or V-friction hoists. This type is very satisfactory for small or medium sized machines, as the friction gear is an assistance to the motor controller in smooth starting.

For large hoists a positive geared motor is more reliable; but it is desirable to interpose a friction clutch or equivalent device at some point between armature and drum, as a safeguard in case of excessive strain on gearing, caused by the inertia of the armature when the drum is stopped by a too sudden application of the brakes. Mr. D. W. Brunton, of Aspen, has designed a slipping pinion, which is used on the electric hoists in mines under his management, and serves this purpose admirably.

The choice of the best kind of motor depends considerably on the size of the hoist, its location, and the nature of the work. For an unbalanced hoist of moderate size, especially if placed underground and exposed to dirt and water, the ironclad series-wound street-car type is well adapted, as it is strong, well protected and designed to stand heavy work on intermittent service. In this motor, efficiency, low heating and absolute freedom from sparking are to some extent sacrificed for compactness and lightness. For large hoists, which are generally located in comparatively clean, dry places, and, if over-balanced, work almost continuously, hoisting and lowering, and in which high efficiency is more important than in small hoists, the stationary type of motor is usually preferable.

The speed controller is one of the most important features of an electric hoist. On many of the earlier hoists the commutated field, thrown into various combinations of different resistances by a cylinder switch, was employed; this form of control being at that time widely used in street-car service. This controller gave quite satisfactory results when assisted by friction gearing; but with positive gearing it would not give a sufficiently gradual start. On most hoists a variable resistance in armature circuit is employed; and by making this resistance sufficiently high, a perfectly smooth start may be obtained, even with slack rope. The most satisfactory rheostatic controller, especially for heavy work, is one in which the resistance is cut in and out by a cylindrical switch with magnetic blow-out, which avoids the troublesome effect of arcing at contacts, when the current is broken.

In some cases it is practicable to use a double-motor equipment, with series-parallel controller, such as is now employed almost exclusively in street-car work.

By over-balancing a hoist, making the counterweight equal to the dead load plus about half the live load, the work in hoisting and lowering can be made approximately equal, and the maximum current and size of motor can be reduced to considerably less than half of what would be required for doing the same work with an unbalanced hoist. This principle is used in the electric hoists at the Free Silver, Alta Argent and Della S. mines at Aspen, and the Silver Lake mines at Silverton, and will doubtless be employed more generally in the future than in the past.

The Alta Argent hoist, in addition to being over-balanced, is arranged in a novel manner. The hoist, with its motor, is placed on a substantial platform above the head of the incline, and is out of the way of the operator, who is located, with the controling levers, just below the hoist and on the level where the cars are run off. This gives more room for handling the cars as they are raised, and enables the hoist operator to do this work.

The largest electric hoist in the world is on the Free Silver shaft at Aspen, Colo. It is an over-balanced double-reel, flat-rope hoist, equipped with a 100-kilowatt four-pole motor, capable of developing 120 horse-power continuously and 150 to 175 horse-power intermittently. An auxiliary 60-horse-power motor, ordinarily doing other work, is arranged so that it can be geared to the hoist countershaft and assist the large motor, if necessary. Each reel has 1,500 feet of four by three-eighth-inch flat rope, weighing two and three-quarter pounds per foot. The cage weighs 1,375 pounds, bucket and ore (hung from cage in sinking) about 2,400 pounds, car and ore about 3,500 pounds, and bailer, containing 111 cubic feet of water, about 9,000 pounds. Two counterweights are used, the one for cage and bucket weighing 2,450 pounds, and the one for cage and car 2,675 pounds, the two being combined when bailing. Two armature pinions are provided (the motor sliding on rails), one for ordinary hoisting, giving a speed of 600 feet per minute, and the other for bailing at 1,000 feet per minute, which, with the maximum load of about 10,000 pounds (bailing), would require over 300 horse power net, exclusive of friction in gearing and rope, were it not for the over-balanced arrangement. Actual tests have shown that the average current consumed in hoisting with counterweight is only about one-third of the amount required when the hoist is unbalanced.

Pumps—The electric pump presents a somewhat more difficult mechanical problem than the hoist, on account of the conversion of rotary into reciprocating motion, and the importance, in most cases, of compactness and protection of the motor against water. That the problem has been satisfactorily solved, however, is proved by the large number of electric pumps of various kinds and sizes in successful operation.

Duplex and triplex pumps, both vertical and horizontal, are suitable for operation by electric motors. For small pumps, where plenty of space is available, a belted motor affords the cheapest arrangement and gives satisfactory results. In the majority of cases a geared pump with motor on the same base is best. Both spur and worm gears have been used successfully, various devices being employed with the latter to neutralize the thrust. In the Virginius 70-horse-power pump, the armature shaft carries two worms, one right and one left-hand, working into two gears which mesh into each other. In the 15-horse-power pump in the same mine, the armature is placed vertically, and its weight approximately offsets the thrust. In most of the electric pumps made during the past few years, spur gearing has been used, and with good results.

The sinking pump is the most difficult to design, on account of the small space available for the motor and the necessity of inclosing it in a practically water-tight case, but numerous successful pumps of this kind have been made and installed. The three-phase induction motor is specially adapted to this work, as it has no brushes or moving contacts, and the wires can be carried through water-tight bushings in the case to the stationary terminals on the field.

Speed control is an important question in electric pumping. Where waste of power is unobjectionable, a rheostat in armature circuit is suitable. If high efficiency is imperative, and the required variation in speed is not great, it may be economically accomplished by varying the field strength of the motor, either by commutating a sectional field or by the use of a rheostat. When the generator supplies nothing but the pump, an excellent method is to vary the generator voltage by changing its speed or field strength, or both. In some cases a water by-pass can be advantageously used. In others it is best to pump at full capacity intermittently. The most suitable method is a matter of judgment in each case.

Blowers—The running of blowers and exhausters is another simple operation, the motor being either belted, geared or direct connected to the blower shaft. Small outfits of this kind, placed at various points throughout the mine, run continuously with very little attention, and afford the most economical and satisfactory ventilation—far superior to the vitiated air that has passed through air compressors and drills.

Percussion Drills—To obtain with electricity the rapid reciprocating motion with varying stroke and necessary elasticity required in a percussion drill, and at the same time get a machine that will stand unlimited abuse, has been the hardest problem in the mining field that the electrician has had to solve.

Two general methods have been followed. One employs the ordinary rotary motor, connected to the drill by a flexible shaft and producing the oscillatory motion by cranks, cams, levers, springs and similar devices. The other uses the solenoid principle, the plunger being moved back and forth within two solenoids, placed end to end, by currents sent through the two alternately, these currents being shifted automatically at the drill or generator—generally and preferably at the latter.

The solenoid type of drill is the only one that has been used commercially and successfully in this country. These drills were tried in several mines in Colorado and elsewhere about four years ago, but were only partially satisfactory. The principal defects were lack of pulling power, heating of solenoids, unsoldering of connections and breaking of drill chucks, due to the crystallization of the bronze of which they were at that time made. These defects have been remedied by better electrical and mechanical design of solenoids and connections, and the adoption of an all-steel plunger and chuck. The improved drills have been used successfully for some time in quarrying and tunneling in the East; and a few plants, as shown in the table, have recently been installed in mines in this vicinity, the operation of which will throw much light on the exact value of the drill for mining use.

Diamond Prospecting Drills—In contrast with the percussion drill, the rotary diamond drill is more easily and satisfactorily operated by an electric motor than by any other power, not only because the rotary motion of the motor can be applied directly to the drill, while the reciprocating motion of a steam or air engine must be converted, but also because the former is much steadier than the latter, and causes less wear and breakage of carbons. Moreover, the transmission of power into a mine by electricity is more economical than by steam or air, and the electric drill, with its wires, can be more conveniently moved from place to place than the steam or air drill and pipes. On account of these advantages the electric diamond drill has become a favorite wherever current can be conveniently obtained.

Coal Cutters—Electricity was successfully used for coal cutting even when the direct-current motor was the only kind available. The application to the chain cutter of the three-phase induction motor, without commutator, collector or brushes, and avoiding all possibility of sparking, has produced an almost ideal machine for this work. Another valuable characteristic of the induction motor for this kind of service is the fact that, when overloaded beyond a certain limit by striking a hard stratum or by sticking of the cutter, it stops, thus relieving both motor and machine from excessive strains.

These coal cutters are being rapidly introduced in the East, but have not

yet been used in this part of the country.

Locomotives—Electric haulage in mines, under ordinary conditions and where distance and tonnage are not too small, is without much question superior to any other system available. It is more flexible than rope haulage and more economical than mules or compressed air.

Electric locomotives have been principally employed in coal mines on account of larger tonnage and longer hauls; but, as shown in the appended list of plants, are coming into use in metalliferous mines, and will be used more widely as long tunnels, tapping numerous veins, become more common.

Mine haulage is similar in most respects to street-railway service; but the locomotives must generally be adapted to narrower gauge, the motors should be better protected, the speed is slower and the weight on driving-wheels greater.

The series-parallel controller, now so widely used in street-car service, which throws the motors in series for starting and slow speeds, and in parallel for higher speeds, is not so suitable for a mining locomotive, for the reason that the slipping of one pair of wheels (which is more liable to occur than on a street car, the load being behind the locomotive and the rails being more slippery) increases the speed of the motor on that axle, raises the counter electromotive force and cuts down the current through both motors, if in series, thus reducing the power of both. For this reason some form of rheostat controller is generally used.

The essential requirements in a mining locomotive are compactness, strength, simplicity, convenience of handling and especially durability and freedom from repairs.

Placer Mining Machines—Electric power has been very satisfactorily applied to the operation of placer mining machines, several motors being employed to run the different parts of the dredge and gravel-treating apparatus. One motor generally raises and lowers the dipper; one forces it into the bank; another works the turn-table for depositing the gravel in the hopper, and a fourth operates the cylinder, tailings-carrier, amalgamator, etc. All of these motors are supplied by a generator located at any convenient point. The peculiar adaptability of electric motors to such work is evident; in fact, it would be difficult to operate such a machine in any other way.

The Bennett Amalgamator Manufacturing Company is operating a plant of this kind for the South Park Mining Company at Green River, Utah, and the Gold Dredging Company has a similar installation at Bannock, Montana.

ELECTRO-METALLURGY.

Copper Refining—The principal application of electricity to metallurgical operations in this part of the country is copper refining, which is carried on extensively at Anaconda and Great Falls, Montana. The plant at Anaconda consists of eight electrolytic generators, aggregating 1,870 kilowatts, and its capacity is 125 tons of refined copper per day, the average output being about 100 tons per day. They also have a 100-kilowatt, 110-volt power generator, supplying two 25-horse-power locomotives and three traveling cranes for handling and transporting materials and product.

The commercial success of the process is toowell established to require discussion. Its economy is principally a question of the cost of power and the scale on which operations can be conducted.

Gold and Silver Extraction—Electricity has been applied as an auxiliary in various processes for the treatment of gold and silver ores by cyanide, chlorination and amalgamation. While some of these processes are based solely on the faith of the inventor that a current of electricity sent through his mixture will in some mysterious way produce results that he can not otherwise obtain, others undoubtedly possess merit, as they are founded on well established laws of electro-chemical action. These processes are usually conducted with considerable secrecy, and it is impossible to give any reliable data as to the actual results accomplished or the economy of the operations. There is reason to believe, however, that, with the proper combination of chemical, metallurgical and electrical knowledge brought to bear upon this subject, good results may be expected.

ELECTRIC MINING MACHINERY.—ELECTRIC AUGER COAL-DRILL.

FUTURE DEVELOPMENT.

During the past eight years, and principally in the last four years, 52 distinct companies in the Rocky Mountain district alone have installed electric-power machinery for mining and ore-reducing purposes, comprising 62 generators, aggregating 7,988 kilowatts, and 135 motors, aggregating 4,816 horse-power, operating every variety of mining and milling machinery.

Electric apparatus, formerly regarded as delicate and peculiarly subject to breakdowns, has been brought to such a degree of pefection that depreciation and repairs may be considered as less on this than on almost any other kind of machinery.

The multiphase high-voltage system has brought nearly every mining district within economical reach of water power.

The induction motor, without commutator, collector or brushes, is the acme of simplicity and durability.

Electro-metallurgical operations are increasing and give promise of success.

Under these conditions it may be safely predicted that during the next five years much greater progress will be made, and the application of electricity will become one of the most attractive and important features of mining economy.

NEW LIGHTING COMPANIES.

The Emporia, Kas., Electric Light, Railway and Gas Company has been chartered. The capital stock is $100,000. The directors are A. M. Caffman and Frank R. Biedler, of Baltimore, Md.; J. A. Bendure, Atchison; Wm. Addis, D. W. Hainer, H. Parkman and J. O. Patterson, of Emporia, the latter being the prime mover in the plan which has been under consideration for a year.

The Jasper Electric Light Company, Jasper, Ind., has been organized, and has contracted with the city to furnish twenty 2,000-candle-power arc lamps for five years. The Royal Electric Company, Peoria, Ill., has secured the contract for a 1,000-light alternator and the complete electrical equipment, through their representative in Indiana, Chas. M. Katterjohn, of Boonville, who will superintend the construction of the plant.

BOOK NOTICES.

"The Electric Railway in Theory and Practice," second edition, revised and enlarged, has been received from the publishers, W. J. Johnston company. This is a popular and valuable work, brought up to date by the authors, Mr. Oscar T. Crosby and Dr. Louis Bell.

We have received a very complete, well illustrated descriptive catalogue of the Institute for Home Study of Engineering, and of its electrical apparatus, from Cleveland, Ohio. We understand this is sent free to applicants, and those desiring copies should address the Institute at the Blackstone Building, Cleveland, Ohio.

The new X-ray book by Dr. W. J. Morton, entitled "The X-Ray; or, Photography of the Invisible," is meeting with remarkably large sale, both in the 50-cent and $1.00 editions. It is profusely illustrated, and the interesting subject is treated in a popular and entertaining and instructive manner. It is supplied by the ELECTRICAL REVIEW.

ELECTRIC LIGHT FLASHES.

The contract for the electric plant for the new public safety building at Pittsburgh, Pa., has been let to Westinghouse, Church, Kerr & Company, of this city.

The Caribou Water and Electric Light Company, of Caribou, Me., is making preparations to place a large engine and boiler near the dam, to furnish power for electric lights.

A part of the electric lighting plant at Bunker Hill, Ill., has been installed and the light turned on. The incandescent lights for residence and business houses will be put in soon.

The Utica, N. Y., Electric light Company is increasing its facilities by building a new boiler house 50 by 40 and 30 feet high. There will be an increase of 800 horse-power, making a total of over 2,000.

The electric light company at New Sharon, Iowa, has ordered a new 750-light dynamo. The new building, 30 by 50 feet, is being built of brick and will be fireproof. They expect to be ready to start early in October.

The stockholders of the Johnstown, Pa., Electric Light Company, at their annual meeting, elected the following board of directors for the ensuing year: W. H. Rosensteel, Jr., Charles F. Kress, Fred W. Stammler, James G. Ellis, Joseph Freidhoff and James Quinn.

The following officers were elected at the annual meeting of the Amherst, Mass., Gas and Electric Light Company: Clerk and treasurer, C. F. Denel; directors, E. D. Marsh, Mason Dickinson, Professor C. H. Fernald, C. F. Denel, Frederick Tuckermann, Henry Adams and Leonard M. Hills.

The property of the Orient Electric Company, of Youngstown, Ohio, incandescent lamp manufacturers, was recently sold under a chattel mortgage. Mr. John Shaw bought it in. It is thought that a reorganization scheme may be put through, as some of the stockholders are good. There is said to be nothing for other creditors.

Mr. Alfred Solf, United States consular agent at Chiclayo, Peru, under date of July 6, 1896, reports that an electric plant is wanted at that place, and perhaps at other places in the neighborhood, and he desires to hear from American manufacturers, so that he may supply them with full particulars of the plant required.

PRESENT STATUS OF THE DISTRIBUTION AND TRANSMISSION OF ELECTRICAL ENERGY.

BY LOUIS DUNCAN, PRESIDENT AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS, SEPT. 23, 1896.

The industrial life of mankind is made up of two things. The transformation and distribution of material and the transformation and distribution of energy. The raw material from mines and forests is changed to finished products and distributed among the people, while energy, obtained from water power, coal or other sources, is changed from the potential energy of the water or the energy of chemical combination to mechanical power, heat, light, etc. Unless we can transmit this energy economically, we must transform it into the required form at the place where it is to be utilized. At present a large part of our mechanical power is obtained from steam plants situated in the factories themselves, and for heat and light we mainly depend upon stoves and lamps in our houses.

Before the introduction of electrical transmission, it was possible to distribute energy to limited distances by various methods, but no system offered a long-distance transmission for all purposes. By means of compressed air or steam pipes the energy of coal has been transmitted to produce mechanical power or for heating, and gas mains have allowed the distribution of gas for lighting or for fuel.

In the case of power obtained from steam plants the economy incidental to large units and a steady load has led to the concentration of industries. Where steam is used the plants are situated where it is most convenient for manufacture. Where water power is employed it is necessary to bring the factories to the location of the power irrespective of other conditions.

By means of dynamo electric machines, the energy obtained from either coal or water power may be transformed into electrical energy; may be distributed and then transformed again into mechanical power, light or heat, or may be used for a number of purposes peculiar to this form of energy alone. The limits to the distance of this distribution are imposed by conditions of economy and safety.

It is my purpose to take up the different methods of transmission and distribution and to consider the limits that are actually fixed by the present status of electrical development. The question is a commerial one, each problem presenting different conditions which must be considered, but certain general principles govern each case, and our knowledge and experience make it possible to judge the practicability of each particular transmission.

GENERATING PLANTS.

At the present time practically all of the electrical energy distributed is generated in plants operated either by steam or water power, and it is important to consider the conditions of maximum economy in large generating plants, as this bears directly on the subject of transmission and distribution.

A large proportion of the electrical plants in this country are steam plants. In the last 10 years we have advanced from small stations, using high-speed dynamos for light and power distribution, to large stations, using, as a rule, low-speed direct-connected machines. The simple engines that were used some years ago have, in many cases, been changed to compound and even triple-expansion engines, and, where it is possible, condensers have been employed. Some of the latest plants have machinery of the highest possible efficiency, and yet, if we consider the price per horse-power of the power generated, we will find that it is greater than we expect. This is partly due to the fact that for both lighting and power purposes the load on the station is, as a rule, not uniform, and the apparatus is not working under the best conditions for economy. In this country electrical energy is principally generated for electric lighting, for electric traction and for supplying stationary motors, the stationary motors, as a rule, being supplied with current from lighting stations. If we take the load diagram of such stations in large towns, we will find that the average output is not greater than 30 to 40 per cent of the maximum output. We have, therefore, to supply a large amount of machinery corresponding to the maximum demand on the station, while for distribution a large amount of copper is required that is only being used at its maximum capacity for a comparatively short period of the time. In stations supplying power for traction purposes we find a variation of load, but the variation is a different kind from that found in a lighting station. In the latter the load varies at different hours in the day, but for any particular instant it is practically constant. In the former the average load for different hours during which the station is operated will be practically constant, but there will be momentary variations depending upon the size of the station and the type of traffic. Taking for instance a 2,000-horse-power station in Baltimore, I find that the average load is 48 per cent of the momentary maximum load. This difference in the kind of variation for the two types of stations necessitates employment of different apparatus to obtain the maximum economy for each type. For lighting stations triple expansion engines may be used, while for traction work, where the variation in the load is sudden and may occur after the steam is cut off from the high-pressure cylinder, it is not well, in general, to go beyond compound engines, and there is even a question as to whether simple engines are not more economical when condensing water can not be obtained. In any case, however, it is of the utmost importance as regards economy of operation that the load should be made as constant as possible.

Two distinct types of distribution are used for incandescent lighting in this country—the single-phase alternating-current and the direct-current three-wire system. At the present time the former does not permit the supplying of power. As alternating distribution is at high potential, it does permit the location of the station where the conditions of maximum economy can be fulfilled. The three-wire incandescent system using low voltages may be used for supplying motors, but the amount of copper necessitated by the low pressure has caused such stations to be located near the center of distribution, irrespective of the best conditions for the economical operation of the plant.

With the alternating system it seems impossible to provide even a moderately steady output, but with the continuous-current system the motor load during the day gives an average output greater in proportion to the maximum. Some years ago the question of the relative values of the alternating and direct-current systems was discussed, and for a while most of the stations installed were of the alternating type. At present the tendency seems rather in the direction of continuous-current stations, especially in towns where there is a large demand for current within a comparatively small area. There is a great advantage of direct currents in that they allow the employment of storage batteries, which equalizes the load on the station. In almost all of the large lighting plants, both here and abroad, this plan has been adopted to a greater or less extent, and the results have been so favorable that the battery equipments in many of our stations are being increased. The efficiency of batteries in lighting stations is comparatively high, while the depreciation has been greatly reduced, and is not now over five of six per cent per annum. In most systems, however, the full benefit of the storage batteries is not realized, as the batteries are placed in the station, and while the advantage of an approximately constant load is obtained, yet the further advantage offered in distribution is not secured. I will take this question up later.

In New York, Brooklyn, Boston and Chicago a large proportion of the direct-current lighting stations are situated where it is expensive to handle the coal and ashes, and where the economy, due to condensation, is not obtained. It is also the custom to use several stations instead of a single large station, and this increases the cost of production both in operating expenses and fixed charges. The question arises whether we have reached a point where it will be more economical to consolidate the stations in the best possible location for economical production of energy, and make use of the means of distribution which have been developed in the last few years to increase the radius at which energy can be supplied.

As far as traction stations are concerned, their efficiency and output would be increased by the use of batteries, both because the machinery would be steadily loaded and because the most efficient type of apparatus could be used as is the case in lighting stations. By the consolidation of railroad properties that has taken place in the last few years, single corporations operate electric lines over extended areas. It is the custom to build a number of stations, each running a certain section of the line, the idea being that the decreased cost of copper and the decreased possibility of a shut-down would more than compensate for the increased cost of operation and fixed charges. It is, again, important to consider the question whether we have not reached the point where a single station can be built in such a way that there is little or no possibility of any accident causing a suspension of the entire traffic of the system, and where improved methods of distribution will decrease the amount of copper so that it will not exceed that required by the present method of using a number of generating stations.

If storage batteries are used the two types of variable load belonging to lighting and power stations demand different types of battery. For lighting stations a considerable capacity is required, while the momentary variations of power stations do not require any great capacity, but demand as great a maximum output as battery manufacturers can obtain.

In water power plants the conditions of economy are different. The location of the plant is, of course, definitely fixed, and the advisability of obtaining a uniform load, by means of batteries, depends upon the local conditions. If the water power is limited and is less than the demand, then it might be well to use batteries in order to increase the amount of salable power. Again, if the development is expensive, it might be cheaper to develop a smaller amount of power, pay for a smaller amount of machinery and increase the output by the addition of batteries. These are questions that can only be decided by a knowledge of the local conditions.

We may conclude that while the practice in large lighting and traction systems is to multiply stations near centers of consumption, yet the economy of a single large station makes it important to consider whether it is not possible to concentrate our power at some point where the expenses will be a minimum, and distribute by some of the methods which have in the last few years proved successful and economical. It is important to make the station load steady, and this may be done for continuous-current lighting and traction plants by means of storage batteries.

ELECTRICAL DISTRIBUTION.

The distribution of electrical energy to consumers, as distinguished from its transmission to long distances, has been largely accomplished by the agency of continuous currents, although alternating currents have played an important part in incandescent lighting. As I have stated, a considerable proportion of current for lighting is distributed at constant potential on the three-wire system, or at constant current on arc-light circuits, while power for traction circuits is distributed at approximately constant potential at an average of, say, 550 volts.

I shall first consider the condition of affairs in a traction system in a large city, where a number of suburban lines are operated. If direct distribution is attempted from a single station, it will be found that when the distance exceeds five or six miles a large amount of copper must be employed to prevent both excessive loss and excessive variation of potential on the lines. On suburban lines it is the latter consideration that usually determines the amount of copper used, and this is especially true on lines where there is a considerable excursion traffic. Even in the city itself, the supplying of sections at distances three or four miles from the station may require so much copper that it would be less expensive to operate separate stations. Several methods other than the direct method may be employed to remedy these difficulties. For outlying lines, where the traffic is mainly of the excursion order, being variable both during the day and for different seasons, boosters may be advantageously used. It is, perhaps, best, from reasons of economy, to run the boosting dynamos from motors. These dyamos are series wound and are connected to feeders of such resistance that the fall of potential in the wire for a given current is compensated, or by the rise in voltage of the booster. There is a decreased cost of copper incidental to this system, due to the fact that the drop is not limited by considerations of regulation—the voltage at the end of the feeder being constant—while the transmission is at an increased potential. If the average station potential is 600 volts, and it is boosted 300 volts, then the copper for a given loss would be decreased in the ratio of 36 to 81. The booster system has the advantage of the direct system when the cost of the additional apparatus, together with the increased loss on the line, capitalized, is less than the increased cost of the copper necessary to produce the same result by the direct system. Whether the balance is in favor of one or the other depends on the distance and the variation of the load, and it is indifferent whether the variation in the latter occurs often or not.

(To be continued.)

ELECTRIC RAILWAY NEWS.

A number of railroads in the United States are contemplating placing electric headlights on the locomotives in place of the present headlights.

The Electric Tramway Company, of Bristol, Ct., has bought a new 200-horse-power boiler. It will be set up as a reserve, to be used only in case of accident or when more power is needed.

The Wakefield, Melrose & Malden Street Railway Company, a new company which was recently organized for the purpose of building a line from Melrose Highlands to Malden, has given up the project.

The Ann Arbor & Ypsilanti, Mich., Electric Railway Company has entered into a contract with the Michigan Electrical Company for a complete electrical equipment for the road, and will cost between $25,000 and $30,000.

The New Orleans, La., Traction Company's earnings are decreasing, because the company can not get power enough to run cars to handle the traffic offered. It buys its power from the Louisiana Electric Light Company.

The Industrial Improvement Association has voted to give $50,000 toward building an electric railway between Sacramento, Cal., Orangevale and Fair Oaks. Minneapolis capitalists have agreed to invest $300,000 in the enterprise.

A company of American capitalists have completed the purchase of all the street railway lines of Monterey, Mexico. They will be converted into electric lines, thus providing Monterey with the first electric street railway system in the republic.

The syndicate of New York and Philadelphia capitalists, which has been formed to construct an electric trolley railway between these two cities, has given out a contract for work that will cost $475,000. A power house, to cost $100,000, is to be erected near Bound Brook, N. J. It is said that the road, with all its branches, will be 1,000 miles in length.

Electrical Railways in Europe.

United States Vice-Consul J. F. Monaghan writes from Chemnitz, July 11, 1896:

The number of electrical railways, street and other, went up in Europe during 1895 from 70 to 111; length of lines, from 700 kilometres to 902 kilometres (1 kil. metre=3,250 feet); power, from 18,150 to 25,095; the number of cars (wagons), from 1,236 to 1,747. Germany, with 406 kilometres, leads the list. The following table shows the ratio of the different countries:

Country.	Kilometres.	Power.	Cars.
Germany	406.4	7,194	857
France	182	4 490	225
England	94.3	4,243	143
Austria-Hungary	71	1,949	157
Switzerland	47	1,559	86
Italy	39.7	1,800	84
Spain	29	600	36
Belgium	25	1,120	48
Ireland	13	440	25
Russia	10	540	32
Servia	10	200	11
Norway and Sweden	7.5	925	15
Bosnia	5.6	75	6
Roumania	5.5	140	15
Holland	3.2	320	14
Portugal	2.8	110	3

THE SOUTHERN NEW ENGLAND TELEPHONE COMPANY.

WHAT IS GOING ON IN ITS TERRITORY.

In a recent issue of the New Haven, Ct., *Leader*, the following article was published under the head of "Mr. Tyler's Inventions; a Scheme to Protect Life and Property:"

The Southern New England Telephone Company have completed the necessary arrangements for the establishment of their new department—the watchman and burglar-alarm system—in connection with their telephone service.

The system was devised by President M. F. Tyler originally for the First National Bank Building, and then the thought occurred to him that if it was a good thing for this institution, it ought to be a good thing for all places where a watchman's service is required.

The necessary apparatus has been set up in the First National Bank Building, and will be set into operation to-day. The scheme, although a simple one, is the most perfect and effectual one yet devised.

The ELECTRICAL REVIEW wrote to President Tyler in regard to this new development of the telephone business, and received the following interesting reply, which we think is best presented in President Tyler's own direct language, and we know it will be read with interest by every telephone exchange manager in the country:

"I received your letter of the 11th yesterday, and was a good deal amused and surprised at the clipping which you inclosed. I do not read our local papers very thoroughly; as a consequence I often miss things of this kind. I see that the article is the result of a conversation which I had with one of the reporters, for the purpose of having some notice made in the paper of our burglar system, but really I didn't expect to appear in the role of an inventor.

The facts about this device are very simple: We have had in contemplation for a long time some method of hearing from our various exchanges at regular intervals during the night, without the trouble of calling them up and without the use of our toll lines. To this end, Mr. Baker, general superintendent, not I, conceived the idea of using the guard wire on our extra territorial lines as a signal wire. In the central office is set a Gamewell register, and at each exchange is placed a common messenger call fire-alarm box with one signal, connected with the guard wire of one of the lines running into the office. These guard wires all concentrate in the central office in New Haven, and can be switched on to the Gamewell register. You see our purpose. It was to have the box in each office pulled so many times during the night, to let us know that the operator was up and awake. If his signal didn't come in he was called. After all this had been decided upon, a suggestion which was made to us some time ago by the Hartford banks was taken up and applied experimentally in New Haven. We had a four-pen register, so we had room for more than our own work.

The banks in New Haven are almost all of them visited every hour during the night by two watchmen. Our device was to place a common messenger call box in the bank and attach it to one leg of the metallic circuit. At the central office a very simple device was arranged to switch that telephone circuit in the evening on to the Gamewell register. Instructions were given to the watchmen to pull the box or boxes in the bank whenever they went into it. You see the result. We have in the central office a record of the hour and minute at which each bank is visited. If there should be an interruption in these calls, it would mean either neglect on the part of the watchmen or trouble at some bank. In such case it would be our duty to call the police and to locate to them the difficulty, as far as possible. As this service is almost without cost to us, and is rendered from the existing telephone line of our customers, the charge for it is small.

This is all there is to the invention. It is simply an endeavor on the part of this company to make our wire connections with our numerous subscribers serve as many purposes as possible.

An Inclosed Electric Bell.

Patent papers have recently been issued to E. G. Worley, 2115 Third Avenue, New York, for an electric bell which has the magnet, tongue and mechanism inclosed as illustrated in the accompanying cut, and a wire screen covers the back of the bell. The idea is that a bell of this construction will be adaptable in instances where dust and gatherings collect and prevent action in the old style. The owner of the patent of this bell states that he desires to dispose of the manufacturing privilege for the general introduction in the electrical field.

NEW ELECTRIC BELL.

National Electric Light Association —Manufacturers' Meeting.

TO THE EDITOR OF ELECTRICAL REVIEW:

For the greater convenience of several of the manufacturers who have signified a desire to be present, the date of the meeting for discussing the standardization of the incandescent lamp base and socket has been changed from Thursday, October 8, to Friday, October 9, commencing at 10.30 A. M., at the rooms of the American Institute of Electrical Engineers, Havemeyer Building, this city.

Yours very truly,
GEO. F. PORTER, Secretary.
New York, October 1.

The Big Cottonwood Power Company, of Salt Lake City, Utah, is just completing the erection of a station. Three large transformers, transforming 10,500 volts, standard high pressure, have already been put in, and operations will be begun soon.

An Electric Telegraph Without Any Line—A Danish Invention.

A young boatswain of the Danish navy, P. Sörensen, says the Danish *Export Review*, of Copenhagen, has constructed a telegraphic apparatus by which it is possible, without any direct line from land, to communicate with a ship at a certain anchor ground.

An electric battery is placed on the shore. One pole is in contact with the water or moist earth, while the current from the other pole, through a telegraph key and a revolving interrupter, is conducted to a cable, which is laid out to the anchor ground and placed round the latter in a coil with a diameter of 1,000 to 1,200 feet.

On board the ship, which is situated at the anchor ground, or a little outside the coil, there is a small solenoid with which a telephone is connected.

When you give some communication from land through the telegraph key, a bell sounds on board the ship. They go to the telephone and get the intelligence you give, by means of longer or shorter signals, based, for instance, on Morse's alphabet. The apparatus may also be constructed in such a way that they will be able to answer you from the ship. Nay, the inventor thinks he will succeed in getting so far that you can simply speak to one another as in a common telephone.

Mr. Sörensen carried on his experiments for two years before he reached a satisfactory result. Now, the Home Department has permitted him to establish such a telegraph between the lifeboat station at Tyborön and the anchor ground of the steamship "Vestkysten," so that people on land may always be in communication with the ship. The expense in connection with this undertaking will be about 3,000 kroner.

The Home Department, however, wanting to be fully satisfied that the ship may always know when you commence telegraphing from land, has given orders to construct the apparatus in such a way that an electric arc lamp is automatically lighted on the shore opposite to the anchor ground at the same time as you commence telegraphing. It is to be raised automatically, too, to the top of a pole and throw its light over the ship.

Two vessels at sea will also be able to telegraph to one another when they both have a solenoid on board. The distance in which they will be able to do so depends on the length of the wire and the power of the electric current. Flag signals between men-of-war in time of war may easily be discovered by an enemy—it is now not necessary to use them.

Foreigners have, in vain, spent large sums of money to reach the result which has now been attained by this energetic and clever boatswain, who is essentially a self-taught man.

The United States Electric Lighting Company, of Washington, D. C., has decided to expend in the neighborhood of a million dollars in the improvement of its plant in the District of Columbia.

ADVANCE INFORMATION

Valuable News and Tips for Manufacturers and Dealers.

We publish below information relating to new electric railways, new electric light companies, new telephone companies and projected electric construction of all kinds. Every reader will find these columns of special interest, and manufacturers and supply houses will receive many valuable suggestions looking to new business by carefully watching this department in the ELECTRICAL REVIEW.

Business Troubles.

CLEVELAND, OHIO—A receiver has been appointed for the Warwick Electric Manufacturing Company.

BOSTON, MASS.—Application has been made by the Westinghouse Electric and Manufacturing Company and others for the appointment of receivers for the Baltimore & Cantonsville Construction Company, of Baltimore, Md.

TOPEKA, KAS.—The franchise, plant and fixtures of the Harrison Telephone Company were sold by Sheriff Kepley on foreclosure to Edward A. Rozier, of St. Genevieve, Mo.

New Telephone and Telegraph Companies.

DIXON, ILL.—The Lee County Telephone Company has been incorporated to maintain a telephone plant. Capital stock, $20,000. Incorporators, L. D. Pucher, I. B. Countryman, J. A. Ayres, W. A. Dysart and C. F. Emerson.

WHITEHALL, MONT.—A new telegraph line is being built by the Northern Pacific Railroad from this place to Gaylord.

AUGUSTA, GA.—This place is soon to be connected with Savannah, Charleston, Columbia and many other sister cities by long-distance telephones.

Electric Light and Power.

DECHERD, TENN.—E. D. Sanford is interested in the establishment of an electric light plant.

MILAN, TENN.—The Carloss Weil Company will probably buy an electric light plant.

OCONTO, WIS —C. A. Bridger, City Clerk, can give information concerning construction of 100 arc light plant.

CLEVELAND, OHIO—Bradley Electric Light, Heating and Power Company has been incorporated by George Lillis, John C. Burgess, S. H. Holding, M. W. Neal, Frank S. Masten. Capital stock, $100,000.

STAUNTON, ILL.—Bids are wanted for furnishing a lighting plant for this place. Wm. H. Bryan, consulting engineer, Turner Building, St. Louis, Mo., can be addressed.

ROCHESTER, N. Y.—The village council has granted a 10 years' franchise for an electric light plant, which, it is expected, will be in operation in two months.

KANE, ILL.—Electric lights are to be established here.

SEARCY, ARK.—The Electric Light and Power Company has ordered additional machinery for its plant.

ELKHART, IND.—S. E. Barney, of this place, intends to put in an electric light plant at his driving park.

CHICAGO, ILL.—Carroll Collins, of this place, has purchased the Home Electric Light and Power Company's plant at Elkhart, Ind., and will personally manage the plant, making extensive improvements.

JAMESTOWN, N. DAK.—This place will be lighted by electricity again.

LITTLE YORK, ILL.—A franchise has just been granted some Peoria parties to establish and maintain a plant here.

CARTHAGE, N. Y.—The American Electric Light Company is contemplating the purchase of a Leffel water-wheel to increase the power. The demand for lights makes this necessary.

FOREST CITY, PA.—A movement is being inaugurated for the establishment of an electric plant here. Arthur Kehrns is interested.

OXFORD, MASS.—Horace Fay has purchased old Gates farm from the Mechanics' Savings Banks of Worcester, and will make extensive improvements. He proposes a scheme for the use of the water power on the place for an electric light plant.

MANISTEE, MICH.—James L. Sibben, City Clerk, can give information concerning lighting of city with 100 arc electric lights.

ARLINGTON, ORE.—Steps are being taken to construct an electric light plant.

MOUNT PLEASANT, IOWA—Steps are being taken to purchase an electric light plant, for which $10,000 bonds will be issued.

ATTALLA, ALA.—City Clerk can give information concerning establishment of electric lights.

PORTLAND, ME.—The Committee on Lights is considering offers for a new system of electric lighting.

CHICAGO, ILL.—The North Shore Heat, Light and Power Company has certified to a change of name to the Chicago Savings Company, also enlargement of object of incorporation.

STAPLES, MINN. — The Village Council has decided to adopt a system of electric lights for the village by franchise. R. Aundle, village president, is interested.

CAMDEN, TENN.—A move is being made to have an electric plant here and light the town by electricity.

ST. DENIS, MD.—The citizens of this place, on the Baltimore & Ohio Railroad, have decided to light their village with electric arc lights. The work of erecting poles and stringing the wires will commence in a few days. The power will be furnished by the Edison Electric Illuminating Company of Baltimore city.

New Electric Railways.

WORCESTER, MASS.—The Westminster Street Railway Company has been organized by D. C. Miles, Wm. Mayo, F. A. Merriam, Artemus Merriam, P. P. Ellis and others, to build an electric street railway to Mount Wachusett. Capital stock, $100,000.

CONNELLSVILLE, PA.—The Connellsville Suburban Street Railway Company has been incorporated by S. R. Slaymaker, John F. Barrey, Lancaster; Joseph Soisson, John D. Frisbee, H. S. Newmyer, John Soisson, R. W. Soisson, to build a line to connect Connellsville and South Connellsville. Capital stock, $25,000.

NORTH PEORIA, ILL.—The Glen Oak & Prospect Heights Electric Railway Company has been granted a franchise.

HAVERHILL, MASS.—An electric road is in contemplation to pierce the center of Rockingham County.

NEWTON, MASS.—The Wellesley & Boston Street Railway Company has been granted permission to build an electric railway.

LOS ANGELES, CAL —C. A. Luckenbach, city clerk, can give information concerning electric street railway.

SAN FRANCISCO, CAL.—An electric railway is being constructed in Santa Barbara.

BEAVER FALLS, PA.—The Riverview Electric Railway Company, organized two years ago to build a line from here to Beaver, via Patterson's Heights, but which did nothing further than to secure a charter and subscriptions to stock, also rights of way, has again taken up the project, and it is likely the line will be built, probably this Fall.

BROCKTON, MASS.—The Newtonville & Watertown Street Railway Company have been granted permission to construct and maintain a street railway through North Beacon street, across the Watertown arsenal grounds.

ESSEX, MASS.—The Essex County Street Railway Company will construct an electric railway to connect the Newburyport & Amesbury road with the road at Ipswich.

DERBY, CT.—The Shelton Street Railway will relay track, and John Fagan & Sons have been awarded contract for the construction of road.

NORWICH, CT.—The Exeter & Hampton Electric Railway (Exeter syndicate and Boston capitalists) held a meeting recently in regard to new electric road.

BOSTON, MASS.—The New York, New Haven & Hartford company will extend electric lines to cover most of its suburban traffic.

BRIMFIELD, MASS.—The Southbridge & Fiskdale Electric Railroad will probably be extended through this town.

The receipts of the W. B. & S. Electric Road, of Spencer, Mass., during the first 67 days of its operation were $11,616.85, which represents a collection of 235,337 five-cent fares.

Manhattan Electrical Supply Company.

The Manhattan Electrical Supply Company is arranging to move to its new factory in Jersey City, and expects to get settled there this month. This company is one of the largest manufacturers of household electrical supplies and batteries in the country. They now employ about 400 hands, and in the new building will have facilities for extending their product. The building is of brick, five stories high, and will be equipped with all improved machinery. Mr. H. T. Johnson, the head of the company, is an energetic and successful manufacturer who well deserves the success that his company has won in the electrical field.

Chicago Electrical Association.

The Fall announcement of the Chicago Electrical Association presents quite a list of special papers. The officers are W. Clyde Jones, president, 100 Washington street; S. G. McMeen, vice-president, 1314 Ashland block; F. S. Hickok, treasurer, 242 S. Jefferson street; J. R. Cravath, secretary, 890 Old Colony Building; Albert Scheible, F. A. Muschenheim, S. B. Jamieson, directors.

The papers are as follows:

October 2, "Modern Views of Electricity," F. J. Dommerque, chief draughtsmen Chicago Telephone Company; October 16, "Patents as Investments," Albert Scheible, manager for George Cutter, electrical specialties; November 6, "The Metric System in Electrical Industries," F. S. Hickok, engineering department Western Electric Company; November 20, "Daily Problems in Long-Distance Telephony," E. L. Andrews, engineer, American Telephone and Telegraph Company; December 4, "Notes on the Modern Ground Return System," G. W. Knox, electrical engineer, Chicago City Railway Company; December 18, "Decorative Lighting," E. J. Jenness, draughtsman, Western Electric Company; January 15, "Conventional Diagrams of Electrical Apparatus," D. W. C. Tanner, with Barton & Brown, patent attorneys; January 29, "New Uses for Electricity in Architecture," Chas. G. Armstrong, consulting engineer.

The Standard Air-Brake Company, of New York, Mr. E. J. Wessels, general manager, has issued a timely leaflet entitled "Convention News about Standard Air-Brakes." In it the company says, among many other direct and to-the-point statements: "We do not show our air-brakes on any cars in St. Louis, for it is needless. Besides, a car on 'dress parade' isn't a safe criterion. We do better, by directing you to hundreds of our air-brakes in daily successful operation. Not only abroad, but at home. Strange that we get more encouragement abroad (where speeds are very slow) than we do in St. Louis, where high speeds prevail. Our air-brakes, which were running when the Atlanta and Montreal conventions met, are in operation still, attending to business. If they hadn't been durable we would not have gotten repeat orders. Thirty Standard air-brakes are in their third year of successful operation on the double-truck cars of the Buffalo Railway Company (renewals very trifling; flat wheels, none); 10 are in their second year and 38 in their first year, on the Los Angeles & Pasadena road, with similarly good results; 11 are in operation on the Akron, Bedford & Cleveland road, with a grade of over 13 per cent, near Cuyahoga Falls, Ohio; 18 are on the Washington, Alexandria & Mt. Vernon road, protecting double-truck cars, making a speed (over some stretches) of 45 miles an hour."

HUNDRED INTERESTS

The Midland Electric Company, 5 Hanover street, New York, have perfected for commercial introduction the "Royal" dry battery.

DeVeau & Company, telephone manufacturers, 32 and 34 Frankfort street, New York, are furnishing instruments for several government contracts.

The factories of the Eddy Electric Manufacturing Company at Windsor, Ct., are operating 10 hours a day, practically at full capacity, for the production of the standard Eddy generators.

Edwards & Company, 144th street and Fourth avenue, New York, report a number of large orders for the new induction coil illustrated and described in the ELECTRICAL REVIEW several weeks ago.

The New Ninth Regiment Armory has been accepted by the State board. It was wired throughout with Kerite wire, the well known and reliable insulated wire, manufactured by Mr. W. R. Brixey, of 203 Broadway, N. Y.

The Empire Lamp Works, 154–6 West Twenty-seventh street, New York, are making a special two-volt battery lamp, also a four-volt, high-efficiency bicycle lamp, and a novel line of multiple and series candelabra lamps.

J. A. Grant & Company, of Boston, the New England agents for the McIntosh, Seymour & Company engines, say that the prospects are most encouraging for a large amount of heavy contract work in the near future.

The Standard Thermometer and Electric Company, of Peabody, Mass., have just prepared for general distribution a new catalogue of the Upton arc lamps. A number of improvements and changes in design have been made which will appeal equally to the consumer and central station manager.

Mr. George H. Kimber, who for a number of years has been identified with the Interior Conduit and Insulating Company, has opened an office in the Hathaway Building, 620 Atlantic avenue, Boston, and will act as the New England representative of the Columbia Incandescent Lamp Company and the Wagner Electric Manufacturing Company.

The H. P. Ball Manufacturing Company, 101 Beekman street, New York, have just prepared for circulation a small folder illustrating and describing the new switchboard installed in the dry goods house of Jas. McCreary & Company. The board is 10 feet long and 7 feet high, and is equipped with the round-base switches made exclusively by this company.

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Address "ENGINEER,"
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41 Park Row, New York City.

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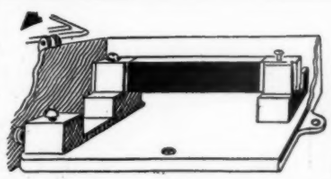

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ELECTRICAL PATENTS

[Specially reported for this journal by E. S. Duvall, solicitor of patents, Loan and Trust Building, Washington, D. C. Copies of any patent may be secured for 10 cents each.]

ISSUED SEPTEMBER 29, 1896.

568,323 Manufacture of graphite; E. G. Acheson, Monongahela City, Pa.—Consists in subjecting a carbid to the action of an electric current and thereby decomposing it and causing the combined carbon to separate in the form of graphite.

568,335 Signal box; C. W. Cornell, East Orange, N. J.

568,346 Telephone mechanism; J. L. Given, Stony Point, N. Y.

568,350 Alternating-current electric motor; F. S. Hunting, Fort Wayne, Ind.—An alternating-current motor having a closed secondary circuit and means for varying the phases of the electro-motive forces developed in different parts of said circuit.

568,370 Electric alarm for steam gauges; A. Ransom, Wise, W. Va.

568,408 Means for attaching or detaching electric light globes; F. W. Mayer, Hartford, Ct.—Comprises a semi-circular band and a circular band, both of said bands being connected together and adapted to engage an incandescent lamp at relatively remote points in its lengths, and a pole or handle secured to said device.

568,412 Process of pickling metals; A. S. Ramage, Chicago, Ill.

568,413 Brush holder; S. H. Short, Cleveland, Ohio—An adjustably mounted brush-supporting board of suitable non-conducting material arranged between the brush and the end of the motor armature.

568,414 Armature winding; S. H. Short, Cleveland, Ohio—An armature coil having side and end portions, said side portions provided with paper insulation and said end portions provided with tape insulation.

568,415 Flat winding for armatures; S. H. Short, Cleveland, Ohio.

568,430 Annunciator time caller for railroads; J. J. Cowhig, Manassas, Va.

568,444 Electric weather indicator; W. M. Kelch, Dayton, Ohio.

568,447 Secondary battery; F. King, London, England.

568,450 Electric switch; J. E. Meek, New York, N. Y.—A swinging blade to which the supply current is delivered, the rotating table having its axis non-coincident with the pivotal point of the swinging knife-blade and the contact pieces connected with the work circuits carried by said table.

568,451 Electric thermostat; J. E. Meek, New York, N. Y.

568,458 Tandem-parallel controller for induction motors; W. B. Potter, Schenectady, N. Y.—Contacts and cross connections adapted to connect the motors in tandem or parallel at will, and cut-out switches arranged to cut out part of the motors without affecting the operation of the remainder.

568,459 Extinguishing electric arcs; E. B. Potter, Schenectady, N. Y.—Consists in causing the lines of force of an arc-rupturing means to localize the arc at approximately a given point of the contacts and then to rupture it.

568,464 Constant potential alternating generator; C. F. Steinmetz, Schenectady, N. Y.—An alternator, an exciter, a regulating machine in the exciter circuit, and a field coil on the regulating machine energized by the commutated or rectified current of the alternator.

568,475 Synchronizing device for electric clocks; W. J. Cruyt, Brussels.

568,493 Automatically testing fire-alarm circuits; L. G. Rowland, Camden, N. J.

568,494 Electric fire-alarm circuit and signal box; L. G. Rowland, Camden, N. J.

568,495 Fire-alarm circuit; L. G. Rowland, Camden, N. J.

568,513 Telegraph receiver; C. L. Buckingham, Brooklyn, N. Y.—A step-by-step feed, a manual controller, a positive lock or catch and means operatively connected therewith for actuating the said catch by the power applied to move the controller.

568,516 Perforator; C. L. Buckingham, Brooklyn, N. Y.—A series of punch actuating magnets, a series of circuit selecting keys, a variable feed device having a series of stop pins, a series of stop pin setting magnets and circuit controllers therefor governed or operated by said keys.

568,523 Trolley system for electric railways; C. E. Davis, Chicago, Ill.—Consists of a series of conductors, each successive secondary conductor taking its departure from its primary conductor at one side and then passing to the other side of said primary conductor.

568,526 Substance for telephone electrodes; D. Drawbaugh, Eberly's Mills, Pa.—Comprises platinum black in an agglomerate mass.

568,527 Telegraph sounder; D. M. Dunn, Abingdon, Va.—Comprises a relay magnet having attached to its armature a buckled plate held fixedly at one end and adapted to have its plane shifted with a click by the movement of the relay armature.

568,566 Construction and operation of circuits for electric motors; F. E. Herdman, Winnetka, Ill.

568,567 Electric elevator; F. E. Herdman, Winnetka, Ill.

568,568 Elevator-motor controlling device; F. E. Herdman, Winnetka, Ill.

568,569 568,570 568,571 Brake mechanism for electric elevators; F. E. Herdman, Winnetka, Ill.

568,577 Automatic arm for telephone receivers; H. Markuse, Germany.

568,606 Electric signaling apparatus; A. Garing, Carlstadt, N. J.

568,608 Alarm device for electric motors; W. A. Gibbs, Pawtucket, R. I.—Comprises an alarm device, an electro-magnet for controlling the same, a source of electricity, a terminal extended through a field piece and having its inner end substantially flush with the inner surface of the field piece, a line wire leading to said terminal and the other line wire connecting with the frame whereby the armature will serve as the other terminal.

568,644 Signaling system for railways; F. G. Timpson, Philadelphia, Pa.

568,668 Electric bell; F. Davey, Detroit, Mich.—A single-stroke electric bell comprising an electro-magnet, a pivoted armature, a pivoted hammer and gong adjacent thereto, and the flexible line or strand connecting the movable end of the armature with the end of said pivoted hammer.

568,675 Telegraphy; R. Greville-Williams, Heywood, England.

568,682 Electro magnetic adhesive device; A. A. Honey, Tacoma, Wash.

568,683 Insulating compound; L. Honig, St. Louis, Mo.—Consists of alcohol shellac, powdered asbestos, glycerine, glue and wheat flour.

568,721 Electric arc lamp; W. Jandus, Cleveland, Ohio.

Special Train to St. Louis.

A special train via New York Central & Hudson River Railroad and connections will be run for the accommodation of delegates and others attending the St. Louis Convention of the American Street Railway Association. The convention will open Tuesday, October 20, at 10 A. M. The special train will leave the Grand Central Station, Forty-second street, New York, Sunday, October 18, at 1 P. M., arriving in St. Louis Monday October 19, at 6.56 P. M. Delegates from all points East can connect with the special at Albany, N. Y.

The special rate of a fare and a third for the round trip has been granted from all eastern points. Delegates will ask ticket agent for certificate, which, when properly countersigned at St. Louis, will entitle the holder to a return trip at one-third the regular fare.

Inquiries relating to the reservation of births, tickets, etc., should be addressed to M. C. Roach, general eastern passenger agent, 413 Broadway, New York. Delegates from New England points apply to J. L. White, agent, B. & A. R. R., 366 Washington street, Boston.

Convention Special via the Pennsylvania Railroad.

The Pennsylvania Railroad will run a special train from New York city to the Street Railway Convention at St. Louis. It will leave New York, foot of Cortlandt street, at 2 P. M., Sunday, October 18, and arrive at St. Louis at 7 o'clock Monday night. Passengers from Trenton, Philadelphia, Washington, Harrisburg, Pittsburgh, etc., can connect with this train. Round trip is a fare and one-third. Full particulars can be learned at the office of Samuel Carpenter, general eastern passenger agent, 1196 Broadway, New York.

Chicago Sky-scrapers.

The Silversmiths' and the Stewart building are Chicago's two latest additions to its long list of towering office buildings. The Electric Appliance Company are particularly interested in the construction of these two mammoth buildings, as they are to be tubed throughout with Armorite iron-armored interior conduit, sold by the Electric Appliance Company, who claim that these two buildings, when completed, will have the finest interior conduit system in Chicago. The Electric Appliance Company are certainly to be congratulated for the enterprise shown in having Armorite selected for these two buildings, and the Armorite company have reason to be proud of the progress that is being made with their tube.

New Pullman Service to Texas, Mexico and the Pacific Coast.

Commencing October 1, the Southern Railway "Piedmont Air Line" will inaugurate a new Pullman Buffet Sleeping Car Line between New York, Birmingham, Alabama, and Washington, and Galveston, Texas. Connecting at New Orleans with the trains of the Southern Pacific R. R., carrying Pullman Buffet Sleeping Cars, New Orleans to San Francisco and the City of Mexico. The new sleeping-car service will be operated on the "United States Fast Mail," leaving New York 12.15 midnight, and Washington, D. C., 11.15 A. M. The famous Washington and Southwestern Vestibuled Limited continues to leave New York daily at 4.30 P. M., carrying Dining Cars and Pullman Drawing-room Sleeping Car, New York to New Orleans, Memphis, Tampa and Hot Springs, N. C. For further information call on or address, General Eastern Office, 271 Broadway.

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REFERENCES: "Electrical Review," New York; Paul Cromelein, Teller Lincoln National Bank, Washington, D. C.; Judge Geo. D. Parker, Berkley, Va.; Second National Bank, Washington, D. C.; E. K. Leech, U. S. Mint, Philadelphia, Pa.; W. P. Newell, Manager and Secretary Water Works, Olympia, Oregon.
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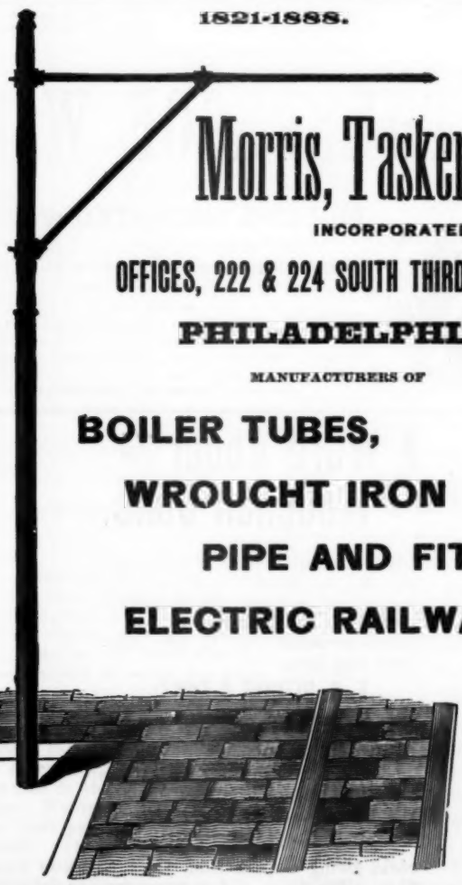

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